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The Chemical Age

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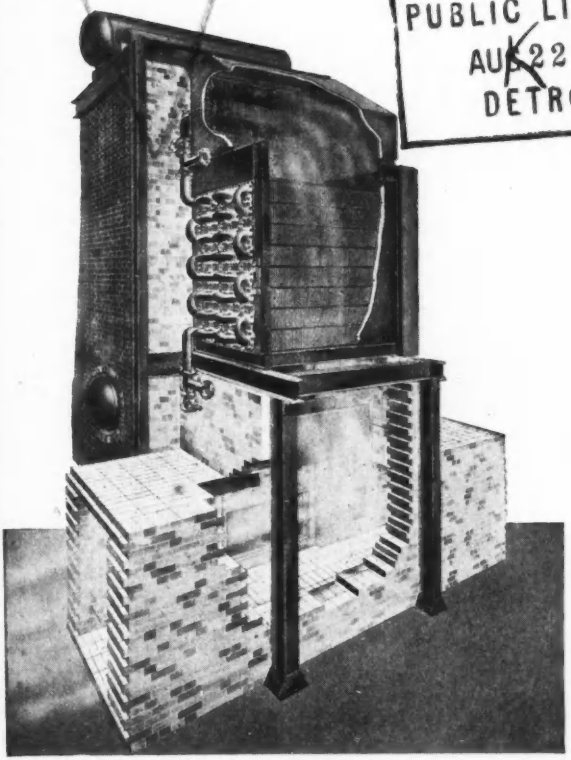

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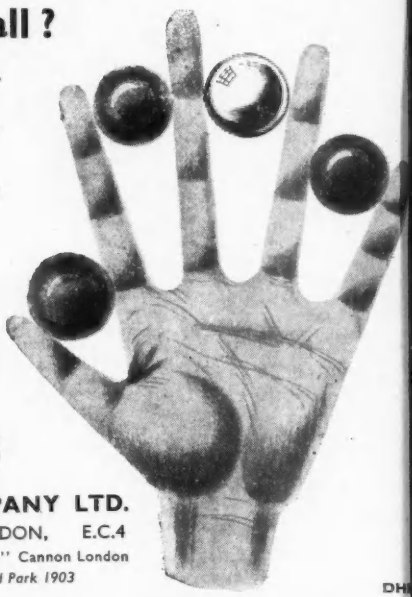

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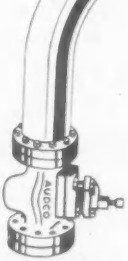

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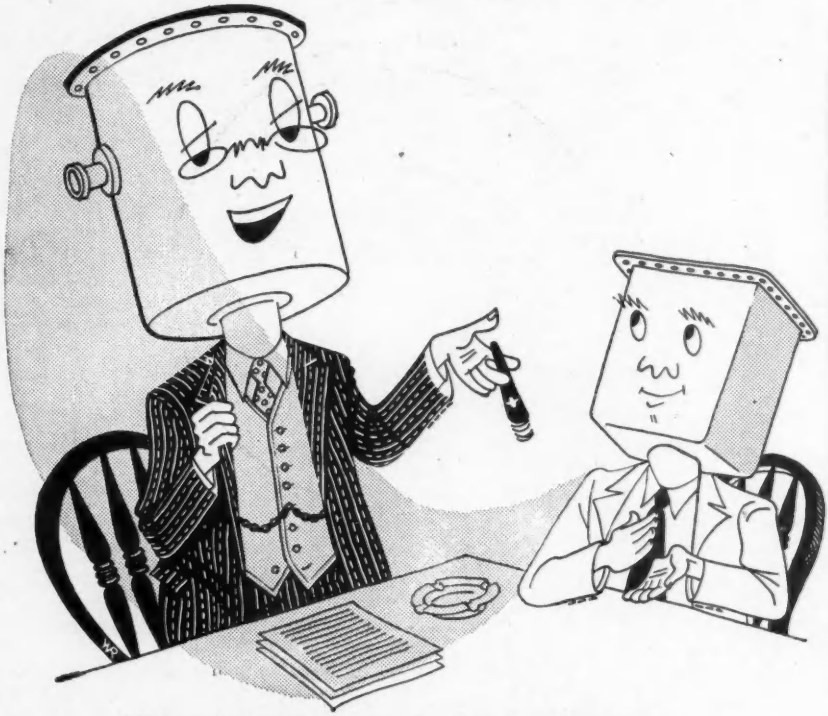

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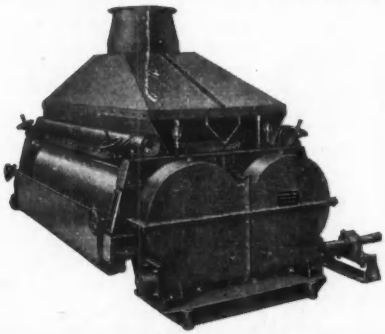

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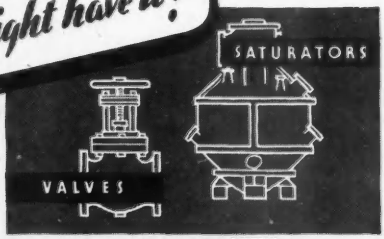

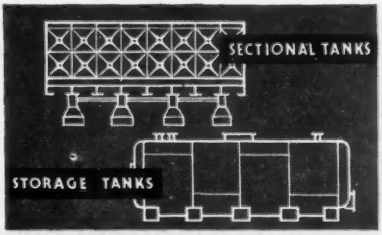

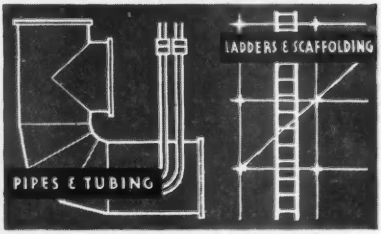

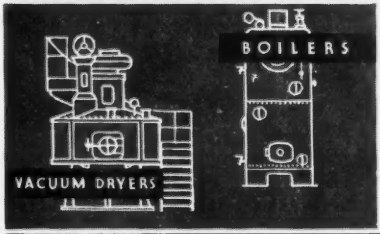

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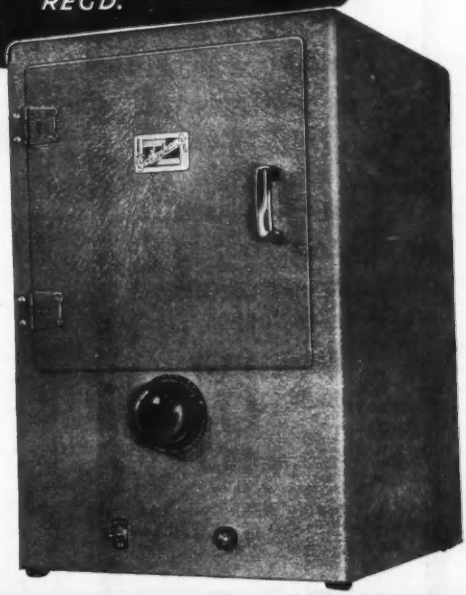

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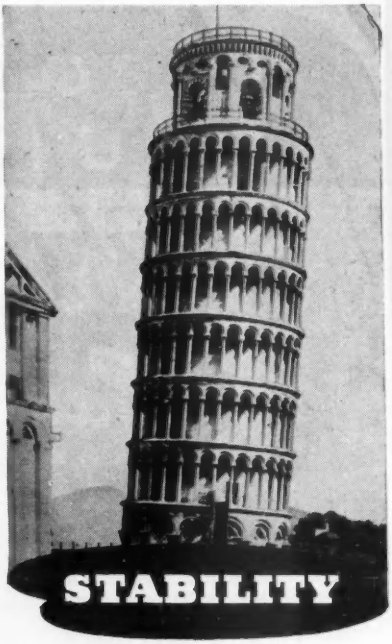

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Volume LXVII 9 August 1952 Number 1726

Another Year's Progress

THE publication of the Society of Chemical Industry's 'Applied Reports' is an occasion to which a leading article has annually been devoted. But now for 1952 this pleasant duty has been doubled; the Society's persistent efforts to speed publication have at last borne post-war fruit and the volume for 1951 has emerged within seven months of the volume for 1950, an event for which the Society's editorial department deserves the highest credit. When in our issue for 19 January this year we said of the 1950 Reports, 'Far from being disappointingly late, publication by early 1952 represents a book-making achievement . . .' we scarcely expected to see the 1951 Reports before the onset of another season of power economy.

There are strong indications that the size and format of these Reports have now reached a period of stability. In fact the number of pages has slightly dropped—for 1950 it was 992; for 1951 it is 878. Having previously expressed the fear that annual expansion might finally make the book too formidable (both for readers and for those who must each year collect and co-ordinate the contributions), we welcome this first sign of contraction since the war. If it indeed betokens an intention to maintain a size of about 850-900 pages for the future, this 'optimum' would seem to have been wisely judged. The number of specialists contributing sections or sub-sections has again increased, however. Last year it rose from 61 to 81; now the 81 has become 86. Perhaps here another optimum is being approached. It may be contended that so diverse a field of progress cannot be discussed by too many specialists; but with equal practicality there is a limit to the amount of sub-division that a single volume can stand and with which the total task can be sensibly achieved. In fact, one of the major decisions of editorial policy must be the extent to which sectional apportionment is allowed. Chemical technology today forms new departments almost as vigorously as yeast cells or algae sub-divide, but the separation is never complete. Fundamental aspects of both pure and applied science are common coinage in many otherwise sharply differentiated technologies and if specialisation is pressed too far the amount of overlapping in these Reports could be excessive.

As in previous years, there are changes in subject classification. The most notable innovation is a new sub-section, 'Heavy Organic Chemicals.' No title could express more succinctly the changing balance of industrial chemistry at this mid-century period. What has

long been a phraseological prerogative of inorganics must now be shared. For this purpose the definition of the Association of British Chemical Manufacturers has been adopted, a 'heavy organic chemical' being regarded as 'a compound, usually synthetic, employed as a prime industrial raw material and also produced in bulk.' The contributors of this new section, Mr. F. E. Salt and Mr. B. N. P. Hutchesson, both of the Distillers Co., Ltd., deserve high praise for giving what will obviously become a regular feature of these Reports so well balanced a start. Their task was not easy for it is only in the United States that there is so far sufficient self-awareness of the development of a heavy organic chemical industry for reasonably comprehensive statistics to be available.

The chemistry of adhesion and adhesives has appropriately been given an increased measure of distinction by subsectional treatment in the 'Textiles and Plastics' section, now enlarged as 'Textiles, Plastics, and Adhesives.' This has meant a divorce in the old marriage of 'Leather and Glue' and for the future leather must live alone in the section on 'Biological Products' with glue, like starch and synthetic adhesives, forming a new alliance based on compatibility rather than accidental association. For this subject the 1951 Reports will have a special reference value for the new series of 'Adhesives' reports are ushered in by an excellent survey of 'Basic Principles of Adhesion.' Another important regrouping has taken place as a result of the Society's formation of a Crop Protection Panel within the Agriculture Group. This Panel now for the first time contributes the 'Control of Pests' chapter, and non-agricultural uses of pesticides take sub-sectional place within this re-arrangement. This no more than reflects the new bias that has arisen in recent years, agricultural applications having expanded so rapidly and widely. Only two years ago—in the 1949 Reports—the agricultural section touched but lightly upon pesticides and this important branch of technology was collectively dealt with under 'Control of Pest Infestation.' This we ventured to criticise at the time and the change that we then suggested has now been made.

Another innovation that should be noted is the new chapter on 'Industrial Gases.' This again reflects a trend of the times, though the new classification must itself be considered arbitrary rather than logical. The gases considered are those manufactured and marketed as such, not coal gas or gases produced as intermediates. Oxygen, nitrogen, the rare gases, hydrogen, nitrous oxide, carbon dioxide, acetylene, propane, and butane are brought into this new section. Here there seems to be some anomaly for this section falls in the main 'Inorganic' section but the last three gases are organic and they also take their places in the new 'Heavy Organic Chemicals' section. This minor case of overlapping could well be eliminated in future Reports. But the last word must not be one of criticism; this hardy annual merits only praise.

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Notes & Comments

Gas and Hot Air

AS IF it was not bad enough having to pay continually increasing amounts for coal and gas, we learn with incredulity that one of the projects that this money pays for is the issue of small elementary pamphlets by the Gas Council. Recently one has come our way entitled *Treasure from Coal*, which explains in a manner suited to a mentally retarded child, some of the wealth of products obtained from coal and some of the uses to which these are put. Thus we are told that 'Coke is a clean and highly efficient fuel for domestic, industrial and agricultural purposes.' Anyone who gets through life without finding this out is really not worth bothering about. Under the section 'Conquest of Disease'—all seven inches of it—we find that M & B 693, derived from coal tar, has reduced the death rate from pneumonia by half since it was discovered in 1938. In fact, M & B 693 (sulphapyridine) was superseded by the sulphathiazoles and others some time ago and has not been in general use in this country against pneumonia for a good seven years. It is also highly unlikely that cortisone will ever be made commercially from coal-tar toluidine, as claimed. Moreover, everyone knows that creosote comes from coal, and that creosote is used to preserve railway sleepers.

Universal Aunt

THIS 'miracle of coal' has already been flogged to death. Ever since the original headline 'Stockings from Coal' appeared in the newspapers the general public has known that there are very few things, chemically speaking, which cannot be obtained from coal, and to go on plugging this fact is like pointing out the variety of products obtained from soil, air and water. They all undergo very far-reaching transformations before reaching their final state, and their source does not matter very much. This unnecessary sally into the land of publicity would not matter in the case of a private firm—anyone may waste money if they choose—but to have this kind of folly imposed upon us by a nationalised undertaking that is trying to make ends meet invokes outraged astonishment. The pamphlet is 'issued' by the Gas Council (it is not clear to whom), and not sold, so there is no possibility of covering expenses, assuming anyone would buy it. Even the publicity can hardly be said to be advantageous, as neither the Gas Council nor the Coal Board are likely to have unsaleable surpluses of their commodities for many years, if ever; in any case, people burn coal and use gas because they have to, not because they want to. If there can be said to be any moral to the pamphlet at all, it occurs in the last paragraph, which states that it is more sensible to carbonise coal than to burn it. Insofar as this is an apology for any shortage of burning coal that may arise, it is fairly adequate, but it can hardly do much to affect coal consumption. The whole undertaking is a good example of the attitude of mind in some nationalised concerns, which puts up prices with one hand and tells everyone how wonderful it is with the other (at public expense). The same people it is who urge people to consume more of their products when Ministers of the Crown themselves are warning them to use less.

State Science

ACCORDING to a recent report in the Press (*Evening Standard*, 25 July) specifications for new inventions are accumulating at the Patent Office because of a shortage of examiners. High scientific qualifications are, of course, required. A quoted statement from the Board of Trade said, 'We have tried advertising the jobs. . . . More attractive pay might bring them in, but the salary is part of the civil service framework and we cannot offer more.' It was also reported that most of the men start as assistant examiners at £400 per annum and, although seniors may reach 'up to £1000 a year' they are rarely appointed straight away. The State in seeking scientists would seem

to be as sensible as a holiday-maker who arrives at one of our most popular resorts in August and hopes to secure full board at 2½ guineas a week. Nor need this case of the Patents Office stand as the only piece of evidence. We have frequently drawn attention to the most seriously bottle-necking example of all—the recruitment of teachers of chemistry within the salary framework of the Burnham scale. Two weeks ago (issue 26 July) we reported a shortage of alkali inspectors and a year ago (CHEMICAL AGE, 30 June, 1951) we devoted the leading article to the very serious shortage of factory inspectors which had been debated in the Commons. Then a Conservative M.P. who has since become a member of the Government pointed out that a junior inspector was receiving only 25-28 per cent more than he would have received before the war. Has translation from the Opposition benches induced its usual change of heart?

Not the Only Problem

NOR, if we rely upon informal information, is remuneration the only financial problem that scientists must face in State employment. In one large branch of government science the duties involve constant travelling within quite large areas. The scales on which travelling and hotel expenses may be indented are lagging behind today's realities with the result that the actual salary paid must be privately regarded as subject to a discount. But an affected worker would have little hope of success were he to claim that this loss in his remuneration should be subject to income tax relief on the grounds of its being an expense incurred in earning his living. This, perhaps, is a minor aspect of the main problem, but it causes considerable heart-burning. Once upon a time a lower standard of pay for government service was regarded as compensated by pension security; today when most firms, even quite small ones, have adopted pension schemes, this attraction no longer counts for much.

Investigation Needed

IN practically every field of state science this problem—more disturbing for the future than it is for the present—is manifested. It seems high time that a Select Commission was appointed to inquire into the whole question of remuneration for scientists in government service, not excluding those who in the field of education must train the scientists of 1962-72.

Two Biochemical Advances

TWO possibly important developments in biochemistry have been reported in Britain this summer (actually on the same day—28 June) in the *British Medical Journal* and in *Nature*. In the former Dr. Yudkin, King's College of Household and Social Science, describes nutritional experiments that indicate the existence of a new growth-promoting factor or vitamin. A beef liver extract, prepared as a powder, fed daily to groups of London children at nursery schools, produced 20-40 per cent extra gains in weight and height. It is believed that the influential factor is not vitamin B_{12}, nor is it certain that the substance is in all liver preparations. Further research to ascertain the distribution and more detailed nature of the active substance is now in progress. The second development, reported in *Nature*, is concerned with disease rather than normal health and growth. Dr. M. A. Soltys of the University of Liverpool has isolated a substance that checks the growth of bovine and human tuberculosis bacilli. This anti-TB substance has been obtained from lymph nodes in tuberculous cattle; similarly prepared extracts from the lymph nodes of non-tuberculous cattle did not inactivate TB bacilli. So far, the inactivation has taken place in test-tube type experiments. Active bacilli that would have produced tuberculosis in laboratory animals six weeks after injection lost this potency after from 4 to 7 days' contact with the lymph node extract. How far this work can lead to a preventative or curative treatment for tuberculosis remains to be determined in much further work. TB bacilli after treatment with the extract may possibly have vaccine potentialities; or the extract itself may be able to inactivate TB germs in the body.

Precious & Non-Ferrous Metals

Widespread Activities of Johnson Matthey Organisation

A TRIBUTE to its subsidiary and associated companies and a description of their origin and development was given by Mr. Hay W. P. Matthey, chairman of Johnson, Matthey & Co., Ltd., in his report on the year ended 31 March, 1952, at the annual general meeting held in London on 30 July.

The widespread interests of the group and its expansion in South Africa and Australia were reviewed by Mr. Hay Matthey who said that the trading profit of the subsidiaries in the consolidated profit and loss account was shown as £515,160.

Starting with the oldest established of its subsidiaries the chairman described how Johnson & Sons' Smelting Works, Ltd., was founded in the middle of the 18th century, as Johnson & Sons, by John Johnson, goldsmith and assayer, the grandfather of Percival Norton Johnson, who in the early part of the 19th century founded Johnson, Matthey & Co., Ltd. The two companies pursued their independent courses until 1926, when the present company acquired control of the older business.

Issued capital of the company was £60,000, which today bore little relation to the size and importance of the undertaking, with nearly 300 employees and a wide range of work.

Company's Main Activity

The main activity of the company consisted of the smelting and refining of sweeps and other residues containing gold, silver, and platinum, received from the United Kingdom and abroad. Closely related to this work was the refining of coinage from all parts of the world including, since 1946, part of the demonetised silver coinage of this country and of the Commonwealth.

Crude bismuth and crude cadmium were also refined on a considerable scale, and either marketed by the parent company or employed by it in its alloys and preparations for the ceramic and pharmaceutical industries.

Johnson & Sons (Assayers), Ltd., had the same origin as Johnson & Sons' Smelting Works, Ltd., the two companies having been formed in 1900 to develop, with separate entities, the business which had previously been carried on by the refining and assaying departments respectively of Johnson & Sons.

This was a small business in terms of capital investment and number of employees, but the quality of its work placed it in the first rank of analysts and assayers of ores, minerals, and metals; so that in addition to holding the appointment as assayers to H.M. Mint and to the Bank of England it had for many years served as referee assayer between important corporations in this country and abroad.

More Effective Service

Oakes Turner & Co., Ltd., of Sheffield, was formed in 1931 by the fusion of E. W. Oakes & Co. with a branch of Wm. Turner & Co., and had been since that date one of the wholly-owned subsidiaries. Its prime function was to provide for the important silver market in Sheffield a more effective service than it was previously able to give from works in London and Birmingham.

Mallory Metallurgical Products, Ltd., was incorporated in 1937 as the English subsidiary of P. R. Mallory & Co., of Indianapolis, to carry on business in powder metallurgy and the manufacture of age-hardenable copper alloys.

Products of the company were largely complementary to the industrial products of Johnson, Matthey & Co., Ltd., and in 1939 a majority shareholding of the English company of P. R. Mallory & Co., Inc., was acquired. The business was then transferred to new premises adjacent to those already occupied by the research laboratories at Wembley.

Since that date the business had grown steadily. The new factory, which in 1939 provided 4,000 sq. ft. of manufacturing space had been increased to 22,000 sq. ft., and the number of employees had risen to 170.

The company's age-hardenable copper alloys provided the solution for many engineering problems, and a substantial part of the output of these materials was sold in the form of resistance welding electrodes for the sheet metal industries.

Output of Mallory 73 beryllium-copper had been restricted during the past year by the acute shortage of material.

On the North American continent the

organisation had substantial and growing interests.

Johnson, Matthey & Company Incorporated, New York, established in 1920, was mainly concerned with buying of platinum group metals and selling them within the U.S.A.

J. Bishop & Company, platinum works, of Malvern, Pennsylvania, had been a subsidiary since 1931. The company was now one of the largest producers of small diameter stainless steel tubing in the U.S.A. Work on the platinum metals had, however, not been neglected. A new platinum refinery was built in 1940 and enlarged in recent years.

Toronto Office

In 1930 a small office was opened in Toronto and Johnson, Matthey & Co. (Canada), Ltd., was formed to market in the Dominion the products of the parent company. Development of the business was such that an arrangement was made with P. R. Mallory & Co., Inc., and Johnson, Matthey & Mallory, Ltd., was formed in 1948. A new factory was built on the outskirts of Toronto and the employees now numbered about 150. It was interesting to note that the young man and his girl assistant who opened the Toronto office 22 years ago were now respectively president and secretary of Johnson Matthey & Mallory, Ltd.

Garrett, Davidson & Matthey Pty., Ltd., of Sydney, represented a linking of the company's interests in Australia and new Zealand with those of Garrett & Davidson Pty., Ltd., a gold refining and manufacturing company with which there had been close business relations for nearly 30 years.

The company was a small one, but during the last five years it had set up in one of the suburbs of Sydney a modern factory for mechanical production, opened a branch office in Melbourne, and acquired a small subsidiary company in Auckland, New Zealand, with an office and some rudimentary manufacturing facilities.

In addition to developing its own trade, the company had assisted in developing the volume of trade between the parent company in London and the Australian market. The present import restrictions had slowed down this trade, but it was to be hoped that the interruption would not be of long duration.

In South Africa a project had been agreed to with Rustenburg Platinum Mines, Ltd., to set up a new works for the preliminary treatment of part of the mining company's increased output of platinum-bearing nickel copper matte. It was expected that a new company to carry out this scheme would be formed during the year.

It had also been decided to form a small wholly-owned subsidiary company in South Africa for the sale and manufacture of precious metals in whatever form the developing industries of that country might require.

Tribute was also paid by the chairman to Mr. Thomas Girtin on his retirement from the board of the company after 31 years.

The report and accounts of the company were unanimously adopted, and a final dividend of 12 per cent, making 15 per cent for the year, was approved.

More Fluorspar For Canada

TO enable it to carry out an expansion programme for increasing production the St. Lawrence Corporation of Newfoundland has signed a contract with the U.S. Defence Materials Procurement Agency for a loan of $1,250,000.

The corporation, one of the two main companies producing Canada's fluorspar, will spend part of the money on installing a zinc float plant to increase the capacity of the present 100-ton mill at its property on the Burin Peninsula. Part will be spent on its U.S. subsidiary plant at Wilmington, Delaware.

New Radiotherapy Source

It is possible that two fission products, caesium^{137} and cerium ^{144}, residue from atomic piles, may be adapted to cancer therapy, according to research reports from Canada. Split radioactive sources with two or more beams converging on the area under treatment are also being designed. Finely divided gold is also used in radiotherapy, the gold being made radioactive and then injected into the body. The metal tends to concentrate in cancer cells, giving a valuable and accurate picture in cancer diagnosis and treatment. Radioactive phosphorus, iodine, and gallium also concentrate in specific body tissues, and these may be used in the future.

A Review of Phenol Analysis

Part IIIb—Quantitative: Biological Determination

IN the last two parts of this review (*see* THE CHEMICAL AGE, **67**, 89 and 113), general methods of quantitative phenol analysis were discussed. These included colorimetric, titrimetric, gravimetric and physico-chemical methods. The present review will be devoted to the determination of phenols in biological materials.

(*a*) IN BLOOD: Only relatively small amounts of phenols are to be found in blood and in biological materials in general, and it is not surprising, therefore, that most of the analytical methods available for the determination of phenols in these materials are colorimetric. Diazometric methods are prominent in this respect. Theis and Benedict[50] precipitate the blood as in the classical Folin-Wu procedure, except that two volumes, and not seven, of water are used, so that the final dilution is 1: 5. The method is then as follows:—To 10 ml. of filtrate, add 1 ml. of 1 per cent gum acacia (to prevent turbidity), 1 ml. of 50 per cent sodium acetate solution and 1 ml. of reagent (prepared daily by mixing 25 ml. of a solution of 1.5 g. of *p*-nitroaniline and 40 ml. of concentrated hydrochloric acid in 500 ml. of water with 0.75 ml. of 10 per cent sodium nitrite solution). After 1 minute, add 2 ml. of 20 per cent sodium carbonate solution, and compare the bright orange colour of the mixture with that developed from a similarly treated standard containing 0.025 mg. of phenol. Conjugated blood phenols are determined after heating 10 ml. of the blood filtrate with 0.25 ml. of concentrated hydrochloric acid for 10 minutes in a boiling water-bath, cooling, neutralising with sodium hydroxide and then proceeding as above, adding the same amounts of hydrochloric acid and sodium hydroxide to the standard. The average phenol content of the blood examined by these workers was 1-2 mg. per 100 ml.

Method Preferable

Marenzi[51] preferred this method for blood phenol determinations. He dealbuminised the blood with 10 per cent trichloroacetic acid before determining the phenol content. The coincidence of his practical and theoretical results indicated the accuracy of the method.

The Moir *p*-nitroaniline method was applied by Marcolongo[52] to the determination of volatile phenols in blood serum or whole blood, in the presence of sodium carbonate and sodium sulphate, was subjected to fractional distillation, and the phenols in the distillate and its ether extract determined in alkaline solution by the Moir procedure. The same worker[52] also determined non-volatile phenols in the blood by the same method after a preliminary deproteinisation. 20-25 ml. of oxalated blood were deproteinised with equal volumes of 0.66N sulphuric acid and 10 per cent sodium tungstate solution so as to obtain a 1: 3 dilution. Mix the filtrate with 250-300 ml. of water and 2 ml. of concentrated sulphuric acid. Distil 250 ml. and extract the residue repeatedly with 25-30 ml. of 4-5 per cent sodium hydroxide solution until 100-150 ml. is used. The ether contains the diphenols: wash with water and evaporate to 20-25 ml. The solution is now ready for colorimetric testing, making use of the diazo reaction. The alkaline solution contains monophenols; neutralise with sulphuric acid and extract with ether. Evaporate the ether and apply the diazo reaction. A phenol standard is used for comparison.

Folin-Denis Reagent

A mixture of phosphomolybdic and phosphotunstic acid is known as the Folin-Denis[54] phenol reagent. Phenols among other compounds, reduce this labile complex to form a blue tungstic oxide. Benedict and Theis[50] adapted the method for the colorimetric determination of phenols in blood. Uric acid is determined in one sample and uric acid and phenols in a second sample: the phenol content is then obtained by difference:—Precipitate the proteins from 5 ml. of defibrinated blood with 5 volumes of boiling 0.01N acetic acid. Add an equal volume of boiling water and 10 ml. of aluminium hydroxide cream, and filter while hot, washing the casserole with boiling water several times. Concentrate the filtrate to half its volume and precipitate again with aluminium cream, or boil to smaller volume and precipitate with colloidal iron. Filter, concentrate the filtrate to about 10 ml. and transfer quantitatively to a graduated cylinder. Add 8 ml. of phenol reagent, 25 ml.

of 20 per cent sodium carbonate solution and 3 ml. of 20 per cent sodium bisulphate solution. Mix immediately and make up to from 50-100 ml. with distilled water according to the amount of colour produced. Compare in a colorimeter after 20 minutes with a simultaneously prepared standard of resorcinol (0.581 mg. in 5 ml.) and make up to 100 ml. Calculate in terms of mg. per 100 ml. of blood. Determine the uric acid on the same specimen, and calculate in terms of phenol. Subtract this from the total colour with phenol reagent, the result representing the mg. of phenol per 100 mg. of blood. The phenol reagent gives a muddy-green colour with the protein-free filtrate from the blood; the addition of sodium bisulphite brings about an instant change to a clear and brilliant hue.

Pelkan's Preliminary Treatment

Pelkan[56] also favoured a modified Folin-Denis procedure for the determination of both free and total phenols in blood. His preliminary treatment involved adding 10 ml. of blood to 50 ml. of water, followed by 10 ml. of 10 per cent sodium tungstate solution and 10 ml. of 0.66N sulphuric acid, and shaking vigorously for a few seconds. 10 ml. of aluminium hydroxide cream are added, and, after shaking, the mixture is centrifuged and the supernatant liquid filtered into a narrow 50 ml. graduated cylinder to the 45 ml. mark. 5 ml. of 5 per cent silver lactate in 5 per cent lactic acid are added and the mixture shaken, centrifuged and filtered.

(i) *Free phenols*: A narrow test-tube graduated at 15 ml. is filled to the mark with filtrate, 1 ml. of reagent (prepared by boiling together for 2 hours under reflux, 750 ml. of water, 100 g. of sodium tungstate, 20 g. of phosphomolybdic acid, 50 ml. of 85 per cent phosphoric acid, and 100 ml. of concentrated hydrochloric acid, and then cooling and diluting to 1 litre) is added, the tube shaken, and the mixture filtered. The filtrate is received into a test-tube marked at 10 ml., 5 ml. of 20 per cent sodium carbonate solution are added, and the mixture is transferred to another tube; the colour is allowed to develop for 20 minutes, and is then compared with that of a standard (prepared from 5 ml. of resorcinol solution containing 5.81 mg. of resorcinol, 0.5 ml. of concentrated hydrochloric acid, 10 ml. of silver lactate/lactic acid solution, diluted to 100 ml., filtered) treated as the corresponding blood filtrate.

(ii) *Total phenols*: The same 15 ml. tube is filled to the mark with the same filtrate, 5 drops of concentrated hydrochloric acid are added and the tube is placed in a boiling water-bath for 10 minutes. After cooling, the solution is treated with reagent as in the determination of free phenols.

Haas and Schlesinger[57] critically examined methods for the determination of free phenol and cresol in small amounts of blood and studied their application in the prognosis of cases of poisoning. They reported that methods based upon the use of the reagent of Folin and Denis were inadequate, since the reagent lacked the specificity for determining separately the free and the bound phenol. The determination of free phenol in blood or serum filtrates, from which the protein has been removed, is complicated by the fact that the protein adsorbs a large amount of the phenol. Furthermore, a separation of this combined phenol does not take place after prolonged heating following the addition of acetic acid, as has been stated. It is possible, however, to separate the free phenol present in small amounts of blood from that portion which is combined by the distillation from a weakly acid solution. Haas and Schlesinger, accordingly, determined the amount of phenol present colorimetrically by the Weiss[69] modification of the Millon reaction.

A new and sensitive method of determining phenols in blood has been proposed by Blanco and Comesana[58]. 2 ml. of blood plasma are diluted with 8 ml. of water, and albumin is removed by treatment with 1 ml. of 0.66N sulphuric acid. 6 ml. of the filtrate are treated with 1 ml. of 5-10 per cent hydrochloric acid and 1 ml. of 1 per cent barium nitrite solution, and the mixture is heated to boiling. After cooling, 2 ml. of 10 per cent ammonia is added, and the colour compared in a colorimeter with a 0.0005 per cent phenol solution treated similarly.

Usual Methods Unsatisfactory

Tanzella[59] claimed that the usual methods for determining phenols in blood were unsatisfactory, and that the only method which gave acceptable results was the xanthoprotein reaction applied to blood deproteinised with trichloroacetic acid.

There are few titrimetric methods for the

determination of phenols in blood, although there is no reason why ultramicrochemical methods should not be introduced. Nassi[60] determined volatile phenols in blood using a bromometric technique. His method is as follows: Mix 1 ml. of serum with 1 ml. of 0.66N sulphuric acid and 1 ml. of 10 per cent sodium tungstate solution, add 7 ml. of water and filter. Wash twice with 5 ml. of water and distil with steam. Collect 50 ml. of distillate, add 15 ml. of 0.005N bromate-bromide solution and 5 ml. of 12.5 per cent hydrochloric acid, keep in the dark for 15 minutes, and titrate with 0.005N sodium thiosulphate. Run a blank. The ml. of bromate solution consumed multiplied by 7.837 gives the mg. phenol in 100 ml.

(*b*) IN URINE: Robbins[61] made a quantitative study of the absorption and excretion of certain resorcinols and cresols in dogs and man. These compounds were determined in the urine by acidifying with phosphoric acid, followed by steam distillation, acidification of the distillate and a triple extraction with ether. The extract, in aliquots of 1, 2 and 4 ml., was evaporated, taken up in 10 ml. of ethanol, and 10 ml. of 2 per cent borax solution added followed by a few drops of 2,6-dibromoquinonechloroimide reagent. After development of the colour, the solutions were made up to 50 ml. with borax solution, and compared with standards at the end of 15 minutes. This method was successful with most phenolic compounds, except those substituted in the *p*-position.

Tisdall's Modifications

The Folin-Denis technique has been applied by several workers to the determination of phenolic substances in urine. Tisdall[62] found that the direct application of this technique gave results 50 per cent less than recorded by Folin and Denis, and suggested that other compounds might be reacting in the latter case. His modified method is as follows:—

(i) *Free phenols* (including aromatic hydroxyacids). Shake 5 ml. of urine for 5 minutes with 100 ml. of ether. Separate the urine and extract twice more with 50 ml. of urine each time. Shake the 200 ml. of ether for 5 minutes with 20 ml. of 10 per cent sodium hydroxide solution, separate, neutralise the alkali, and make slightly acid with hydrochloric acid. Add sodium carbonate and the phenol reagent, and compare the colour produced with a standard phenol solution.

(ii) *Aromatic hydroxyacids*: Extract a duplicate sample of urine with ether and treat the extract with 20 ml. of 20 per cent sodium carbonate solution instead of sodium hydroxide. The difference in the amount of colour developed is a measure of the free phenols present.

(iii) *Total phenols*: Deconjugate as in the Folin-Denis procedure and extract with ether as described above.

Goiffon-Nepveux Technique

Goiffon and Nepveux[63] treat 20 ml. of urine with 2 ml. of 10 per cent sodium tungstate solution and 2 ml. of 0.66N sulphuric acid, and filter after 10 minutes. To 12 ml. of clear filtrate are added 10 ml. of 2.5 per cent zinc chloride solution, and the volume adjusted to 30 ml. with a 20 per cent solution of sodium carbonate. This precipitates the uric acid. 3 ml. of this filtrate (equivalent to 1 ml. of urine) are used for the determination. Make the standard of a solution of 91.1 mg. of pure resorcinol in 100 ml. of 0.1N hydrochloric acid (which gives the same colour as a 0.1 per cent aqueous solution of phenol with the Folin-Denis reagent). To 2 ml. of this standard in a 50 ml. flask, add 0.5 ml. of phenol reagent (according to Wu[64]), 35 ml. of water and 10 ml. of 20 per cent sodium carbonate solution, make up to volume with water and mix. Acidify the 3 ml. of the urine filtrate with a few drops of 1N hydrochloric acid in a similar 50 ml. flask, then add 35 ml. of water and 10 ml. of the carbonate solution, and make up to 50 ml. with water. At the end of 1 hour, compare the colour developed. To determine the conjugated phenols, hydrolyse 3 ml. of the urine filtrate with 2 drops of concentrated hydrochloric acid in a water-bath at 95°C., and carry out the rest of the analysis as before.

Volterra[65] used the Folin-Ciocalteu[66] phenol reagent to determine urinary phenols. The reagent is prepared by refluxing gently for 10 hours 100 g. of sodium tungstate, 25 g. of sodium molybdate, 700 ml. of water, 50 ml. of 85 per cent phosphoric acid and 100 ml. of concentrated hydrochloric acid. 150 g. of lithium sulphate, 50 ml. of water and a few drops of liquid bromine are added, and the solution is boiled for 15 minutes, cooled, diluted to 1 litre, and filtered.

An accurately measured 24-hour specimen of urine is placed in a 250 ml. distillation flask, 150 ml. of distilled water added, the solution made alkaline, and about 40 ml. steam-distilled. The solution is made acid to Congo red paper with sulphuric acid and 100-120 ml. is then steam-distilled. To 10 ml. of each distillate add 0.5 ml. of dilute Folin-Ciocalteu reagent, 2 ml. of 20 per cent sodium carbonate solution, and shake. After 30 seconds, immerse in a boiling water-bath for 1 minute, and compare the colour with a standard. This gives an accurate determination of the volatile phenols present in the original sample.

Scheiner's Investigations

Scheiner[67] has investigated the sources of error in the phosphotungstic acid determination of phenol, uric acid and tyrosine. He emphasises that the reagents developed by Folin and his school are non-specific, and that this leads to errors. Thus, all inorganic reducing substances, except nitrous acid, produce a blue coloration. Hydrogen peroxide likewise behaves as a reducing substance, and divalent iron compounds, even in extreme dilution, reduce the phosphotungstic acid. Among the aliphatic compounds, the unsaturated compounds give an intense coloration. Although formaldehyde or acetaldehyde does not reduce the reagent, aldehyde condensation products cause blueing, even in dilutions in which only tyrosine or adrenaline is effective. Apart from the phenols, the reaction is given by aromatic amines, the reduction being proportional to the number of amino groups. Urea also gives a strong blueing of the phosphotungstic reagent, and thus interferes with the determination of uric acid or phenol in urine.

The Millon reagent has been used extensively in urine analysis, Demel and Scholl[68] determined ether-insoluble phenol derivatives in this way. The urine is made alkaline with barium hydroxide, and the precipitate, produced by treatment with alcohol-ether mixture, is collected and freed from barium with sulphuric acid. Impurities are precipitated from the solution by phosphotungstic acid, the latter is removed with quinine, and the quinine by sodium hydroxide. The resultant water-clear solution is acidified with sulphuric acid and treated with Millon's reagent.

Weiss[69] also determined phenol in urine by a method based on the Millon reaction. Urine, which has been previously freed from protein by barium hydroxide, is diluted 2-5 times with distilled water; 3 ml. are transferred to a small graduated glass tube, and 2 ml. of a 5 per cent mercuric sulphate solution in 5 volume per cent sulphuric acid are added. The tube is closed with a rubber stopper in which is inserted a small condenser, and heat is applied from a spirit lamp for 15 minutes. As soon as the liquid has stopped boiling, 3 drops of 0.5 per cent sodium nitrite solution are added. After 3 minutes, in which the Millon reaction has reached its maximum intensity, the liquid is filtered clear and compared with a standard 1 : 50,000 tyrosine solution. If the unknown is twice or half as strong as the standard, the measurements are sufficiently accurate: beyond these limits, stronger or weaker standards must be made up.

A rapid colorimetric method for free urinary phenols has been devised by Denigès[70]. The urine (2 ml.) is shaken with 2 drops of 1 per cent copper sulphate solution, 2 drops of 10 volume per cent hydrogen peroxide and 2 drops of aqueous ammonia (0.88). After 10 minutes, 4 drops of glacial acetic acid and 2 ml. of water are added. The colour is compared with that produced by standard phenol solutions (50, 100 and 200 mg. per litre) similarly treated, except that the last 2 ml. of water is replaced by 2 ml. of urine. The reaction only indicates free phenols; combined phenols require preliminary hydrolysis.

Baernstein's Determination

Baernstein[71] has determined phenol, catechol and hydroquinone in urine by iodometric and bromometric titration methods. 25 ml. of the urine are measured into an extraction tube, 8 drops of concentrated sulphuric acid added, and the tube immersed in boiling water for 2 hours. Add excess sodium sulphite, cool and extract in a specially designed apparatus with ether. Replace the ether in the extract with water and precipitate catechol at *p*H 6.5 with 2 ml. of 0.1M lead acetate and 3 ml. of pyridine—acetate buffer, filter and wash. Decompose the precipitate with 2 ml. of glacial acetic acid and excess of potassium iodate. Filter out the lead iodate, dissolve with 2 ml. of 30 per cent sodium hydroxide solution and treat with 1 ml. of concentrated sulphuric acid and 0.5 g. of potassium iodide. Determine the iodate of the lead iodate by titra-

ting the liberated iodine with 0.3N sodium sulphite using a Pt-Pt polarised electrode.

Add 1 ml. of concentrated sulphuric acid to the filtrate from the lead catecholate and 5 ml. of 0.2N bromate-bromide mixture. Stopper, and let stand for 30 minutes in a flask containing an open vial of potassium iodide. Then overturn the vial, and titrate with sodium sulphite solution (as above) the liberated iodine, which is equivalent to the unused bromate. In this step, phenol takes up 6 equivalents of bromine. Add 5 ml. of bromate-bromide mixture to the same solution, then three 0.65 g. tablets of sodium bicarbonate, one at a time, and an excess of bicarbonate powder. After 1 hour, titrate again with sodium sulphite the iodine equivalent of the unused bromate. In this step, hydroquinone takes up 10 equivalents of bromine.

Diphenols are kept reduced by using sulphite buffer during the extraction, and ether-soluble acids are held back. If sufficient acid is present, phenol may be brominated without affecting the hydroquinone present.

(*c*) IN FAECES: Debergh and Goiffon[72] determined phenols in faeces by modification of the Folin-Denis technique. 10 g. of faeces are diluted to 100 ml., and 5 ml. of this solution are treated with 5 ml. of 10 per cent sodium tungstate solution and 5 ml. of 0.66N hydrochloric acid. To 6 ml. of the filtrate, corresponding to 2 ml. of the 1: 10 dilution of faeces, 5 ml. of 2.5 per cent zinc chloride solution and 5 ml. of 20 per cent sodium carbonate solution are added. The mixture is agitated and filtered. 8 ml. of the clear filtrate are placed in a 30 ml. cylinder together with the phenol reagent, and the volume made up to 25 ml. with distilled water. Finally, 5 ml. of 20 per cent sodium carbonate solution are added, the mixture shaken and allowed to stand for 1 hour. The blue colour is compared with a standard prepared by dissolving 91.1 mg. of resorcinol in 1 litre of water and treating 1 ml. of this solution by the method just described.

Greater Accuracy Claimed

The method is claimed to be considerably more accurate than the original Folin-Denis technique. Errors occur in the filtration of tungstomolybdic precipitation in the latter method. These are obviated in the method of the authors.

(*d*) IN TISSUE: Watanake[73] described the application of the Theis-Benedict (loc. cit.) method to the determination of free phenols in tissue. 10 ml. of 7 per cent trichloroacetic acid are added to a suspension of 0.5-1 g. of tissue pulp in 10 ml. of water, and the mixture filtered after 1 hour. 0.5 ml. of sodium hydroxide solution (1 ml. should neutralise 5 ml. of trichloroacetic reagent) are then added to 5 ml. of filtrate, the solution diluted to 10 ml. and gum acacia added, followed by the Theis-Benedict phenol reagent. The author successfully determined the free phenol content of various beef organs.

Deichmann-Scott Method

Deichmann and Scott[74] employed the following method for the quantitative determination of volatile phenols, free and conjugated in tissues:—Protein was precipitated from an aqueous extract of ground muscle tissue by the Folin-Wu method. The filtrate was acidified, and steam-distilled. The distillate, containing the volatile phenols was made alkaline and evaporated to dryness (Fraction A). The acid residue was then extracted with ether and the extract treated with sodium hydroxide. This alkaline extract contained the acidic compounds (Fraction B), and the ether extract contained the neutral compound (Fraction C). The aqueous solution from the first ether extraction was made alkaline and again extracted with ether, the final extract containing basic compounds (Fraction D).

All fractions were then evaporated and then diluted to 20 ml. The phenols were determined by adding 4 ml. of 25 per cent sodium acetate in 0.5 per cent gum acacia, 2 ml. of Moir's reagent (diazotised *p*-nitroaniline) and 4 ml. of 20 per cent sodium carbonate to the fractions and to the standard (0.015 mg. of phenol in 20 ml. of 0.1N hydrochloric acid) and comparing them colorimetrically after 3 minutes. Reproducible results were obtained.

(*e*) IN MEAT FATS: A method has been developed[75] for the determination of phenols in meat fats based on the Gibbs 2,6-dichloroquinonechloroimide test. It consists essentially in beating 50 g. of sample for 5 minutes with 200 ml. of a 1: 1 water-alcohol mixture, filtering, chilling, filtering again (to remove most of the fat) decolorising in the cold with charcoal, treating an aliquot with 0.5 per cent borax solution and 2,6-dichloroquinonechloroimide (0.05 per cent in 7 per cent alcohol), extracting the

blue indophenol with butyl alcohol, and reading the intensity on a suitable colorimeter. The method is claimed to be very reliable.

(*f*) IN CEREBROSPINAL FLUID: The Theis-Benedict method was used by Castex and Arnaudo[76] for determining phenols in cerebrospinal fluid. To 10 ml. of fluid, add 13 ml. of water, 1 ml. of 10 per cent sodium tungstate solution and 1 ml. of 0.66N sulphuric acid. Proceed as with blood. A standard is made so that 10 ml. = 0.0125 mg. of phenol. The normal amount of phenols in the cerebrospinal fluid is between 0.2 and 0.36 mg. per 100 ml., existing mostly as free phenols. In several diseases of the central nervous system, a normal amount of phenol was found.

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Change in Sulphur Allocations

SULPHUR allocation to the United Kingdom for the third quarter of this year has been fixed at 85,000 tons. Although this is less than the quota for the previous three months, it is still far bigger than any other country's share in the 232,500 tons of crude and 7,500 tons of refined sulphur allotted for export by the U.S. Office of International Trade.

The crude sulphur allocation for export is the same as the quarterly average in the first half of this year, but quotas to the individual countries have been changed considerably.

Argentina, for example, will get 1,500 tons of U.S. sulphur in the current period, or as much as she got in the whole of the first six months of this year.

This increase is in line with the policy adopted by the International Materials Conference, which recently fixed world sulphur quotas, of letting countries whose stocks have been badly depleted begin to restore them again.

Next largest allocations after the U.K. are Australia with 24,000 tons of crude sulphur and France with a quota of 23,700 tons.

To make up for increased quotas to countries trying to rebuild their stocks, countries which have larger stocks or which are able to obtain sulphur from other sources will have to reduce their imports from the U.S.A.

Among the biggest quotas to Western European nations are 13,000 tons to Belgium and 6,000 tons to Germany. Within the Commonwealth, allocations include 16,750 tons to New Zealand, 15,800 tons to South Africa and 12,000 tons to India.

Fractionating Tower Efficiency

A FIVE-YEAR research programme on plate efficiencies in fractionating towers, a co-operative project between the American Institute of Chemical Engineers and 25 chemical, petroleum, and engineering concerns, was recently begun, according to an announcement of the Research Committee of the chemical organisation. The programme, supported by $64,000 in contributions from the co-operating companies for the first year, will be carried out at the Universities of Michigan and Delaware and the Polytechnic Institute of Brooklyn.

It is intended that the project shall cover basic investigation both in fractionation and absorption. Initial work will cover the effect of system properties on tray efficiencies and the later work will include tray design and column hydraulics.

The Research Committee of the American Institute of Chemical Engineers was organised by the Council of the Institute in July 1950, to foster research projects in chemical engineering which no single institution or company could afford to institute.

Chemical Industries & Economic Recovery

ILO Committee To Hold Third Session

THE importance of the chemical industries in any national economy will decide its degree of industrial development and even its whole economic potential. Considerable interest therefore is likely to be aroused by the discussions of the third session of the Chemical Industries Committee of the International Labour Office to be held in Geneva from 9-20 September when the decisions of the 18 member countries may have far-reaching effects.

Agenda for this meeting have now been published by the International Labour Office, Geneva, in the form of three reports as follows (1) general; (2) vocational training in the chemical industries; and (3) general problems of hours of work in the chemical industries.

The first, or general report, giving as it does a comprehensive and carefully studied survey of the expanding chemical industries and their vital rôle in world economic recovery is probably the most important. It is divided into four chapters dealing with development; employment trends; systems of remuneration; and industrial relations.

When the Chemical Industries Committee met at its second session in Geneva in April, 1950 (THE CHEMICAL AGE, **63**, 43), economic activity was in full recovery after the recession it had suffered following the end of hostilities.

Key Position

During the period covered by the present report, the raising of the level of production had become general both in private enterprise and in planned economies. The chemical industries contributed to this recovery and often considerably influenced the level of industrial production. This is, of course, a significant reminder of the key position of the chemical industries on which power, metals, engineering, textiles, paper, rubber, pottery, glass, and so on, are all to a greater or lesser extent dependent for their raw materials or other necessities.

In world production the U.S. chemical industries take first place, being alone responsible for about one-half of the total production; they are also first in foreign trade. Because of the growing home demand exports declined in 1950, but there was a noticeable recovery in the first nine months of the following year.

Combined chemical products exports of the United Kingdom, the Federal Republic of Germany and France in 1951 exceeded those of the U.S.A., and it may be expected that Western Europe will regain the position in external world trade in chemical products which it held before the last war.

In Europe (excluding the Soviet Union) industrial production, which by 1949 had already exceeded by 10 per cent the level attained in the period immediately preceding the war, increased by a further 14 per cent in 1950. In that year chemical production, composed mainly of industrial materials and fertilisers, was one-and-a-half times that of 1938.

European Recovery

This expansion continued in 1951. During the first quarter, most progress was made in the chemical industries. Progress was not uniform from one quarter to another because of the scarcity—sometimes confined to a given country—of coal and other raw materials such as sulphur.

German chemical industries have already regained the place they held before the war in the world chemical trade and in the national economy. As restrictions have now been reduced, the position has become easier for certain basic products such as chlorine.

Major chemical producing countries in Europe during 1950 and their percentage of the total production were: United Kingdom 25.2 per cent; Federal Republic of Germany 18.7 per cent; Poland 12.5 per cent; and France 9.3 per cent.

In the Soviet Union there was also a marked increase in chemical production. What perhaps distinguishes the development in the Soviet from that in the western countries is that it concentrates more on providing certain key products: sulphuric acid, soda, nitrogen and chemical fertilisers in general.

Japan, another great producer of chemical products and one of the first five in world production before the war, is also well on the way to recovering its place.

To meet ever-increasing demands arising out of the normal development of industrial production and the raising of living standards, and to meet the requirements of national defence programmes, all countries are trying to a greater or lesser extent, to increase production still further in their chemical industries.

Need for Investment

On the whole, and with rare exceptions, the chemical industries in all countries are rapidly developing, thanks to the considerable amounts invested, particularly in those industries which, in certain cases, have their capacity appreciably increased. It may be added further that the chemical industries do not normally work at full capacity, operating usually at 80 per cent to 90 per cent capacity.

Capital investment required by the chemical industries, however, is particularly heavy; in the case of the main basic products, it may represent, according to the country, as much as almost twice the annual turnover.

In addition chemical plant, generally working non-stop, at high temperatures and in conditions which give rise to corrosion, deteriorates very rapidly. Its maintenance is costly and it must be replaced at short intervals—in large part because of rapid technical advances in the manufacture of new products and the development of new processes, calling for frequent changes of equipment.

The amount of investment in the chemical industries will vary especially in relation to the degree of economic development a particular country has attained, although general factors in the sense of applying to industrial activities as a whole, will naturally influence the extent of such an investment.

In underdeveloped countries a considerable effort is being made to expand the chemical industries, both as part of the general industrialisation of the individual country and in the more limited sphere of aiding agriculture by producing adequate quantities of chemical fertilisers.

A private inquiry in recent years showed that 74 per cent of investment in the chemical industries in 1950, 77 per cent in 1951 and a probable 78 per cent in 1952, was devoted to the setting up of a new plant.

In general, the petrochemical branch, using as raw material petroleum or natural gas, has undoubtedly been one of the industries to expand most rapidly. Total investment in this field in 1940 had not reached $350,000,000, it now exceeds $2.000.000.000. In 1951 almost 25 per cent of all chemical products were of petrochemical origin.

Among the factors likely to hinder or hold up the expansion of the chemical industries, the shortage of raw materials is of the most immediate importance.

Apart from sulphur and coal, raw materials of which the scarcity temporarily —and to an extent which varies from country to country—hinders the full development of the chemical industries, include caustic soda, carbonate of soda, calcium carbide and, in particular, chlorine and hydrochloric acid, benzene and industrial benzol.

In the chapter on employment in the chemical industries showing the increase in manpower, the problems of employment and unemployment, and so on, references are quoted from THE CHEMICAL AGE referring to the problems of national service in the U.K., and the part-time course in chemical engineering proposed by the Institution of Chemical Engineers to help meet the shortage of technical personnel.

Payment and Production

Reviewing the system of remuneration in the chemical industries, the report shows how the problem of payment by results met with obstacles which derived mainly from the peculiar nature of the industries themselves.

Increased productivity is accompanied by a tendency for workers' tasks—because of the ever-increasing mechanisation of industrial plant in the chemical industries—to involve more and more mental work. Most of the equipment has become automatic and productivity in many undertakings is consequently wholly independent of the workers' physical effort, but their responsibility has so far increased that it becomes impossible to ignore the contribution of the human factor to the plus-value obtained by increased productivity.

The rate of scientific discovery and its application to industrial production and the full expansion of the chemical industries lends particular interest to their experiments in payments by results.

Because of the great variety in production

in the chemical industries, payment by results has usually been introduced in the form of a group system, as it is often difficult to fix the individual standards accurately or to measure individual results.

In the United Kingdom, although payment by results is not very widespread in the chemical industries, an inquiry in October, 1949, showed that 22 per cent of the establishments in the chemical and allied industries were employing the system but only 14 per cent of the workers were paid under it.

Criteria which influence the payment by results led the Badische Anilin-und-Soda-Fabric, Ludwigshafen, in the Federal Republic of Germany, to make a distinction between the mental and the physcial requisites for the execution of a given task. The following five factors were drawn up:—

(1) Responsibility: for the products and the methods of production, the duration of the process, and the health of others.

(2) Occupational skills: (*a*) theoretical knowledge and practical experience.

(3) Occupational skills: (*b*) competence occupational skill, physical skill.

(4) Effort: (*a*) sense, nerves, presence of mind, concentration, reflection.

(5) Effort: (*b*) muscular strength.

Each of these criteria has five groups. The BASF has a system of points for each group and assesses the task according to the degree of responsibility, the occupational skill and the effort required of the worker.

Vocational Training

Report No. 2 deals with vocational training in the chemical industries and its conclusions raise a number of interesting points for discussion. It emphasises the need for close co-operation between schools and undertakings, in particular to ensure that the vocational training given in schools corresponds to the requirements of the undertakings and of industrial work and that the scholastic organisation of training is sufficiently flexible to adapt itself to changes in these requirements.

Other points brought out are the desirability of special training in order to constitute a body of 'chemical engineers', the need to define more clearly the duties of technicians and the standard of studies required of them; vocational training of skilled workers operating chemical manufacturing apparatus; problems relating to the vocational training of laboratory assistants, their classification in the nomenclature of laboratory posts and their promotion to the categories of laboratory employee or chemical assistant, supervisory staff.

Working Hours

General problems of hours of work in the chemical industries, with particular reference to a comparison of day work and shift work are reviewed in Report No. 3. The report concludes with a list of 11 points proposed for discussion, as follows:—

(1) The effect of shift work on the health of the workers.

(2) Frequency of accidents on shift work.

(3) Production efficiency of workers on shift work.

(4) Effects on the family budget of workers on shift work.

(5) An examination of the most suitable system of shift rotation.

(6) Normal daily or weekly hours of work (a) in day work and in multi-shift processes stopping at the end of the week; (b) in fully continuous processes, day and night and Sundays.

(7) Maximum duration of work authorised during the change-over of shifts.

(8) Definition of overtime in relation to normal working hours and the normal work time-table.

(9) Premium rates for overtime.

(10) Minimum premium rates for shift work.

(11) Organisation of welfare services with a view to lessening the inconvenience caused by shift work, especially on the night shift:—

(a) canteen serving hot meals;

(b) transport facilities;

(c) staggering of hours during which welfare services are available so as to allow all workers to benefit from them.

Bulk Shipments

Regular bulk shipments of Dunlop latex are to be made from Malaya to Rotterdam, primarily for their German company, the Deutsche Dunlop Gummi at Hanau. The first of them, 60,000 gallons, has been discharged from m.v. *Glenartney*. Tank facilities have been leased in the bulk liquid installation of Messrs. Pakhuismeesteren, and the latex will be carried on in bulk rail tank cars.

Properties of Nimonic 95

Stress & Creep Resistance Tested

IN order to meet the steadily increasing demands of gas turbine engineers for materials which will withstand still higher temperatures and higher stresses than the alloys used in current production engines, the research metallurgists of The Mond Nickel Co., Ltd., have continued their investigations in the field of precipitation hardening nickel-chromium alloys.

As a result of 12 years' research, Nimonic 95, an advance on the nickel-chromium alloy Nimonic 90, was recently announced (THE CHEMICAL AGE, **66**, 536).

It has not yet been possible to determine the creep properties of Nimonic 95 in long-time tests or over a wide range of temperatures, but its properties for the relatively short periods which are of major interest for aircraft jet engines show a considerable improvement over those for Nimonic 90.

These properties have now been summarised and are given in the following table, issued by Henry Wiggin & Co., Ltd., which gives the stress required to produce fracture in 100 hours at temperatures between 750° and 925°C., and the approximate minimum creep rate for tests at that stress.

Temperature °C.	Stress to Rupture in 100 hours Tons/Sq. In.	Approximate Minimum Creep Rate for 100 Hour Test Percent/Hour
750	22	0.002–0.005
815	14	0.002–0.005
870	9	0.002–0.005
900	6.5	0.005–0.01
925	5.0	0.005–0.01

Tests are in hand to extend the knowledge of the creep resistance of the new alloy and to determine other properties of importance to designers, but in the meantime it is being produced by Henry Wiggin & Co., Ltd., and is being used in experimental quantities by engine builders.

Synthetic Cryolite

FACED with fast dwindling supplies of natural cryolite, which is used in the process of making aluminium from alumina, the Reynolds Mining Corporation, a subsidiary of Reynolds Metal Company, has purchased a fluorspar mine in Colorado which will supply material for the manufacture of synthetic cryolite. Naturally occurring cryolite is found only in Greenland, where there is only enough left for a six to eight years' supply, according to Walter R. Rice, president of Reynolds Mining.

The newly acquired mine, which includes a flotation plant, is known as the Poncha Springs Fluorspar Mine and was sold to the aluminium company by Fluorspar, Inc. Production of acid-grade fluorspar, required in the production of aluminium, has already been started.

The cryolite, which is produced from the fluorspar, is first melted in an electrolytic cell at about 1,800°F. by passage of an electric current. Alumina is then dissolved in the molten cryolite and direct current is applied. The electrolytic action breaks down the alumina into aluminium and oxygen. One-twentieth of a pound of cryolite is required to make a pound of aluminium, according to Mr. Rice.

Reynolds' production of synthetic cryolite will be undertaken at a separate plant at Hurricane Creek, Arkansas.

Pharmaceutical Awards

THE Pharmaceutical Society has awarded its research scholarship of £300 a year for two years to Mr. L. E. Coles, B. Pharm., Ph.C., of London. Mr. Coles will be engaged in the School of Pharmacy of the University of London in completing work on the synthetic analogues of the adrenal cortical hormones.

Wellcome Pharmaceutical Research Fellowships of £350 a year each have been awarded to Mr. John Thomas, Ph.C., Wigan, and Mr. G. L. Willey, B.Sc., Knaresborough, Yorks. Mr. Thomas will work in the Department of Pharmacy at Manchester University on the chemical synthesis of biological activity, particularly bactericidal action, of a new series of quaternary ammonium compounds. Mr. Willey's research work will be done at Leeds University on the possibility of selectivity of action of nicotine-like stimulant compounds.

The Society has awarded the Jacob Bell Memorial Scholarship (£150 with £5 worth of books) to Mr. T. M. French, Northampton; the Manchester Pharmaceutical Association Scholarship (£45) to Mr. Robert A. Alcock, Ormskirk; and the Devon & Cornwall Exhibition in Pharmacy (£25) to Mr. Allan James Smale, Tiverton, Devon.

Great Progress Made

Tremendous Frontiers Opened for Study

BIOCHEMISTS have made technical advances in the past decade which open tremendous new frontiers for the exploration of how animal tissues breathe, eat, live, and die, David E. Green, professor of enzyme chemistry at the University of Wisconsin Enzyme Institute, said at the International Biochemistry Congress which opened in Paris on 21 July.

Six Nations Represented

Professor Green was one of the speakers from six nations who took part in one of the opening symposia of the congress. He spoke on research done at Wisconsin on the cyclophorase system, one of the chemical factories of living cells.

Not over 10 years ago scientists could only hint at the existence of a long list of enzymes which are now well known to workers throughout the world, Professor Green said. This advance has been the result of experimental methods which permit scientists to extract living enzyme systems from tissue and study them in test tubes. He pointed out that enzymes all work so closely together that it was hitherto impossible to separate an enzyme from its system without destroying both the system and the enzyme.

It is even possible now for scientists to put the enzymes back together into a system—and in doing so literally learn how life works, Professor Green said.

Work was now under way at the University of Wisconsin to obtain pure enzymes by these newly-discovered processes. Most of the work was done with heart muscle, and enzymes could be secured from this type of tissue without being destroyed in the process. The co-operation of the Oscar Mayer & Co. packing plant in providing heart tissue without cost had made much of the work possible.

Production Technique Developed

Last winter it was announced that Wisconsin scientists had worked out a technique for the production of relatively large quantities of pure coenzyme A, an important link in the metabolic machinery of the human body.

Professor Green is due to give a series of lectures at Cambridge University on the work of the Enzyme Institute at Wisconsin.

Cosmetic Chemistry Course

ARRANGEMENTS have been made for a third year course in cosmetic chemistry to be held at the Hackney College, Dalston, E.8. Enrolment will be on 15, 16 and 17 September and classes will begin on 22 September. Fee for the course will be 30s.

Students completing the course and passing the examination at the end will qualify for the diploma of the Society of Cosmetic Chemists of Great Britain. The course will be open to past and present students who wish to comply with the necessary requirements for the award of the diploma and also to others whose standard of knowledge may exempt them from the first and second years of the course.

Syllabus for the course includes:—principles of dermatology; packaging and presentation; product control and shelf life testing; preparation of creams; soaps and synthetic detergents; preparation of lotions; compacted, moulded and oral products; powders; depilatories; perfumery, etc.

Investigating Spraying

IN the House of Commons on 28 July, Mr. J. Morrison asked the Minister of Agriculture if he had considered the long term effect of chemical spraying on agriculture generally, including stock rearing as well as crops; and if he would charge a suitable committee or council with the duty of investigating the whole future of this question.

Sir T. Dugdale, in reply, said that Mr. Morrison could be assured that the long-term effects of chemical spraying were receiving attention in various contexts, and he did not think that any additional investigation was called for. The Agricultural Research Council and The Agricultural Improvement Council had had under review the effect spraying might have on the balance of nature, and the A.R.C. and the Nature Conservancy were conducting research on this problem. An A.R.C. Unit and his Department were carrying out investigations into the long-term effects of weedkillers and his Department was also keeping under review the possible harmful effect of sprays on animals. A Working Party under Professor Zuckerman was inquiring into possible effects on products for human consumption.

Pernis Refinery Expanding

Will Be Largest in Europe

ON Tuesday The Shell Petroleum Co., Ltd., announced that with an increase of more than 50 per cent of its present crude oil processing capacity of 5,750,000 tons per annum, the Pernis (Rotterdam) refinery will have a throughput of 9,000,000 tons a year by the beginning of 1954. It will thus become by far the largest refinery in Europe, including the United Kingdom.

The additional capacity is to come from a new 3,250,000 tons a year distillation unit on which preliminary construction work has started. The present crude oil distillation capacity of the refinery is 5,000,000 tons per annum; in addition, there is a yearly intake of 750,000 tons of crude oil from the Schoonebeek (Netherlands) oil field.

This new project, estimated to cost £2,000,000, will mark a further phase of the post-war rehabilitation and new construction programme of the Pernis refinery which has already cost over £20,000,000. War damage repairs and replacements brought its capacity during 1946 back to the pre-war level of 1,000,000 tons a year and subsequent new plant construction has raised the figure to its present level.

The Pernis refinery is one of the Royal Dutch/Shell Group refineries which are strategically located to supply the Western European market in the most economical way. Others are located in the United Kingdom (4), France (3), Germany (2), Belgium and Italy; of these the largest plants are at Stanlow (Cheshire) and Shell Haven (Essex) in the U.K. and at Berre, in Southern France. The Group is already the largest refinery operator in Europe with a total annual crude oil processing capacity of over 20,000,000 tons.

The Microscope in Industry

IMPORTANCE of the microscope in industry and research will be demonstrated at an exhibition to be held in London next month by W. Watson & Sons, Ltd., of High Holborn. A wide range of instruments will be on view, various techniques displayed, and a number of specimens shown.

The exhibition will be open for five days from 15-19 September and will be at the New Horticultural Hall, Westminster. Hours on the first day will be from 2 p.m.-6 p.m., on the next three days from 10 a.m.-6 p.m., and on the last day from 10 a.m.-4 p.m.

A brochure showing the scope of the exhibition is being prepared and will be available shortly on application to the organisers.

Density Bottles Standard

A BRITISH standard for density bottles was first published in 1937, but this has now been revised to overcome the difficulties encountered in manufacturing bottles to the original specifications. A new design for the stopper has been accepted, as an optional alternative, which combines a capillary of suitable bore with a wider neck more convenient for the larger sizes of bottle. This will make it easier to fill the bottle with viscous liquids and to stir the contents thoroughly.

The second major amendment concerns the tolerances on capacity. A density bottle of standard quality is normally used only for work of considerable accuracy, in which the actual capacity of the bottle is required to be known. When using bottles made to the original British standard, even with the close tolerances specified therein, it was not always possible to ignore the difference between the nominal capacity and the actual capacity, and the latter had, therefore to be determined by the user. In addition, a density bottle may be used for specific gravity determinations, in which the actual capacity of the bottle is not required to be known, and users then prefer to make their own determination of the weight of water contained by the bottle. The very costly process of adjustment of the original close tolerances is therefore considered not to be justified, and the present edition permits a considerably larger tolerance on capacity.

Apart from the above changes, only minor amendments have been made in the standard, which specifies the material, construction, dimensions and tolerances for 10, 25, 50 and 100 ml. bottles. Appendices give, with examples, standard methods of determining density by the use of these bottles, and the calculations necessary in the measurement of liquid in bulk.

Copies of this standard (B.S.733: 1952), may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1, price 3s.

Court Ends Nylon Pact

Final Anti-Trust Judgment

A UNITED STATES Federal Court judgment was signed on 3 August which cancelled a nylon agreement made five years ago between E. I. du Pont de Nemours and Imperial Chemical Industries. This was the final judgement in the Government's anti-trust suit against the two organisations and also ordered them to end joint ownership and control of du Point affiliates in Argentina, Brazil and Canada.

Last May, Judge S. L. Ryan ordered the dissolution of a world cartel in munitions, arms, chemicals and nylon. The order prohibited du Pont, I.C.I. and Remington Arms from dividing territory and allocating customers and markets 'so as to unlawfully limit the commerce of the United States'. It specified that the Court should retain jurisdiction over the corporation for five years.

The corporations were found guilty in September last year of conspiring to violate an anti-trust Act by agreeing to divide world markets.

Judge Ryan's most recent judgment lists additional steps to implement his May opinion.

The detailed decree directs re-assignment of foreign patents by I.C.I. to du Pont; granting of exclusive licences by du Pont to I.C.I. subject to royalties payments; and a confidential exchange of technical information between these two firms.

Judge Ryan directed that various steps in the degree be undertaken according to a specific time-table and that regular reports be made to his Court.

Nylon was not included in the Government's original anti-trust suit filed in January 1944, but during the trial in 1950 the Government introduced du Pont's development and dstribution of the material.

The Government charged that the firms used a patent agreement illegally as a screen to divide world markets.

Glass Condensers Standard

RATIONALISATION of the designs and dimensions of glass condensers for general use in laboratories was commenced in 1944 by the British Laboratory Ware Association, and has now been carried a stage further by the publication of B.S. 1848: 1952. 'Glass Condensers'. The types included are air condenser, Liebig with rubber connections, Liebig all glass, Allihn (bulb), Graham (spiral), Davies (double-surface) and the Thorpe or 'Inland Revenue' condenser.

Detailed drawings and dimensions are given for each type but, in acordance with current practice in British Standards for laboratory glassware, the dimensions are given for the guidance of manufacturers instead of being mandatory. Condensers fitted with interchangeable ground glass joints are not covered, as they are most satisfactory when designed for that purpose rather than merely adapted from the type fitted with corks or bungs. The special purpose condensers specified for use with standard distillation apparatus and Dean and Stark apparatus are likewise omitted.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street London, S.W.1, price 3s.

Fumes Not To Blame

AT the Wrexham inquest on 29 July on a Monsanto chemical worker, Bernard Jones, of 6 Rock Place, Cefn Mawr, who died on 19 July, a verdict was recorded of death through natural causes. The coroner (Mr. Maurice V. Evans, East Denbighshire) said there was no evidence to prove that the throat cancer from which Jones suffered was due to chemical fumes. Mrs. Margaret Jones, widow, said her husband has been suffering from throat and ear trouble for about two years. He often came home complaining of the 'smells', in which he had to work.

Alfred Rogers, a process supervisor at the Monsanto works, said that Jones had been a neutraliser in his department since the early days of the war. The only danger of fumes, said the witness, was when an excess of acid was run into the neutralising tank—then sulphur dioxide was given off. Asked whether he had ever suffered from any form of throat complaints, Rogers, who had been working in the plant since 1935, replied 'no'. A neutraliser operator, Richard Reed, said that as long as the right quantity of acid was used there was little likelihood of sulphur dioxide fumes escaping from the neutralising tank. Dr. Lionel Wise, consultative area pathologist, said neither sulphur dioxide nor benzene sulphonic acid were known causes of cancer.

Speedier Soapmaking

Continuous High Temperature Process

AN automatic hydrolysing unit and a continuous, high temperature, high pressure process is being used by some American soap manufacturers instead of bath saponification, according to a report appearing in a recent issue of *Soap and Sanitary Chemicals*. The method is said to permit volume production of soaps of good quality with a minimum of waste, and the amount of chemical treatment required is minimised. Complete information regarding the continuous method has not yet been published. However, it is understood that it can produce a good soap of uniform quality in only eight hours, with less than one per cent of waste. Similarly, three varieties of soap may be produced from the same continuous equipment in 24 hours.

Thorough Mixing First Step

First step in the process involves the thorough mixing of the various oils required by the soap formula. Dehydration immediately follows and, the oil and water are then passed through a series of heat exchangers into a hydrolysing unit which splits the contents into free fatty acids and glycerine. The ratio of water to oil, in the hydrolysing unit, is governed primarily by the need to obtain 99 per cent hydrolysis. While the flow rate of oil and water in the hydrolyser is approximately equal, the conditions of temperature and pressure may vary according to the nature of the stock.

After leaving the hydrolyser, the fatty acids are preheated to 300°C. and are passed into a high vacuum zone within a still, where they are vaporised and condensed to form a distillate that is converted into soap.

Tailings Salvaged

A residue of 'tailings' that constitutes approximately 8 to 10 per cent of the entire charge, is left as a result of the distilling operation. 'Tailings' can be salvaged either through use in soaps of lesser quality or through recovery of the fatty-acid content by acid washing. 'Tailings' incurred in the third quality blend, which amount to less than one per cent of the entire production, comprise the only residue that is lost completely. This final 1 per cent residue may be disposed of to tar-distillers. (*New Methods and Machines*. Vol. 1, No. 7).

Vitamin B_{12} From Seaweed

A POSSIBLE new source for supplies of vitamin B_{12} has been discovered by Mr. L. E. Ericson, a young Swedish chemist, working in the laboratories of the Scottish Institute of Seaweed Research at Inveresk, Midlothian. This was announced in Edinburgh on 28 July by Dr. F. N. Woodward, director of the Institute, when he summarised the results of the recent seaweed symposium—the first gathering of its kind for the exchange of information about seaweed.

Mr. Ericson, said Dr. Woodward, began research in Stockholm about a year ago, and had been working at Inveresk for the past two months. He had shown that certain common seaweeds contain the vitamin though he had not yet succeeded in isolating it.

Mr. Ericson's experiments indicate that the vitamin is found in seaweed in about half the concentration in which it is present in liver. He is leaving Scotland soon to continue his work in Stockholm.

Dr. Woodward said that probably nothing like one-tenth of the world's seaweed resources had yet been surveyed, but work so far done had proved the existence of at least 100,000,000 tons of seaweed.

Already in this country there were 200 industrial uses for alginic acid, one of the seaweed products.

Amyl Esters Cheaper

CONSIDERABLE reductions in the prices of certain amyl esters, made possible by a reduction in the cost of fusel oil, have been announced by British Industrial Solvents, Ltd.

With effect from 1 August the prices of 'BISOL' diamyl phthalate, amyl alcohol and amyl acetate will be as follows:—

	Reduced by	New Price
Amyl alcohol, technical	£60	£270 per ton (1 ton lots)
Amyl alcohol, milk testing	9d.	3s. 1½d. per lb. (45-gal. drum) 3s. 4½d. per lb. (5-gal. can)
Amyl acetate, technical	£45	£266 per ton (2 tons)*.
Amyl acetate, B.S.S.	£45	£268 per ton (2 tons)*
Amyl acetate, confectionery	£23	£295 per ton (2 tons)*
Diamyl phthalate	4½d.	2s. 10½d. per lb. (10-ton lots) 3s. per lb. (45-gal drum)

* Spot or contract over 12 months.

All prices are carriage paid, in containers returnable at sellers' expense.

Indian Newsletter

(From Our Own Correspondent)

JAPAN may soon assume a big interest in Indian industries if the talks now going on between the Government of India and Japanese industrialists, backed by their Government, materialise. Following the visit of a Japanese delegation to India a little time ago (as reported in the last Newsletter), the Government of India is sending a mission to Japan to discuss Japanese participation in the iron and steel industry in India.

According to the Japanese Ministry of International Trade and Industry, the Japanese plan proposes construction of two large blast furnaces each of 1,000 ton capacity for the manufacture of pig iron in the Jamshedpur area of India. Further, Japan desires development of the rich iron mines in Bihar and Orissa, which are the biggest and best iron mines in India. Japan is prepared to provide the capital as well as the machinery.

Japan has suggested export of the iron ore, but it is believed that the Government of India prefers some other arrangement. It is learnt that one big Japanese iron producing concern is drawing up a method by which part of the pig iron produced in India would be exported to Japan. Pig iron thus imported would be cheaper than that produced in that country.

As further evidence of Japanese interest comes the news that the Tokyo Firestuff Industry Company has entered into a contract with the Salem Ore Company of Salem (Madras), for setting up a magnesia-clinker plant in India. The proposed factory will have an annual production capacity of 300,000 tons. The necessary machinery will be exported from Japan and the plant is expected to start operations early next year. The magnesia produced in India will be available to Japan at a price which will be considerably lower than that of the imported material from the U.S.A.

Uranium Deposits

It is learnt that small deposits of uranium and thorium have been discovered in parts of the Madras State. The deposits have been found in areas underlain by ancient crystalline rocks and have been located along the East coast and in the extreme tip of Madras State. The Indian Atomic Energy Commission are making a detailed survey of the whole area with a view to assessing the workable quantities and future potentialities. Further rewards up to Rs.10,000 for workable concentrations of uranium and beryllium ores have recently been announced by the Government apart from grants-in-aid and assistance to prospectors and miners.

Uganda's Mineral Potentialities

IMPORTANT results affecting the further exploration and development of minerals in Uganda are expected from talks held recently at Entebbe.

Discussions between representatives of the Rio Tinto Company, Frobishers, Kilembe Mines, Monsanto Chemicals, and African Chemicals and Explosives, with the Uganda Government and Uganda Development Corporation, will, it is hoped, lead to the formation with the Development Corporation of a syndicate for the exploration and in due course working of niobium, phosphates and magnetite deposits which surround the Sukulu Hill near Tororo.

Extraction and separation of these minerals may well ensure for the Protectorate the establishment of an industry producing phosphorous, superphosphates, fertilisers, and at a later stage, iron and steel products.

Electric smelting of phosphorous should be possible when the Owen Falls hydro-electric plant comes into operation.

Plans are under consideration for the manufacture of sulphuric acid at the Kilembe copper mine now under development on the slopes of the Ruwenzori mountain.

Prospecting, proving and laboratory examination of deposits have been actively carried out by the Government and on its behalf by research organisations overseas during the last two years, and responsibility for these operations has recently been transferred to the Development Corporation.

As a result of this combination between private and public enterprise it is hoped that the investigation and research have now become sufficiently advanced to justify the setting up of a pilot plant in the near future.

The Chemist's Bookshelf

REFERENCE BOOK OF INORGANIC CHEMISTRY. By W. M. Latimer and J. H. Hildebrand. 3rd Edition. New York: The Macmillan Company. London: Macmillan & Co., Ltd. Pp. xii + 625. 37s. 6d.

The book of which this is the third edition is by no means well enough known to British chemists. Intended primarily as a text-book on systematic inorganic chemistry to follow on Hildebrand's 'Principles of Chemistry' and Bray and Latimer's 'Course in General Chemistry', it stands ably by itself as probably the most comprehensive book of reference, for its size, in the field of inorganic chemistry, at least in the English language.

Although in its conception it was a students' text-book, the authors point out in the preface that it has not been 'written down' to the level of elementary students, but aims at teaching chemistry through the language 'spoken and used in everyday (chemical) life.' As a consequence this book will function as a valuable source of reference long after the student leaves his training days behind him, and it could well be the first port of call in any search for information in descriptive inorganic chemistry.

Theoretical aspects are not overlooked, and not the least valuable of the contents of the book are the interpolations concerning such topics as ionisation potentials, oxidation potentials and oxidation itself, radioactive phenomena and the like, which appear at appropriate points throughout the text. These are thus suitably integrated in the reader's mind with their inorganic connotations.

As might be expected from the record of the authors, considerable stress is laid on the oxidation-potential approach to the properties of inorganic substances. This may well make many readers realise for the first time that inorganic behaviour is more systematic than they have hitherto believed. Other valuable thermodynamic data are also included and used freely.

In addition to revision throughout the systematic inorganic chemistry of the elements, major additions to this edition include the chemistry of the post-uranium elements and considerable extensions of the chapters on boron, phosphorus and silicon.

For a book of essentially reference character it is surprisingly readable, and one in which the searcher for specific information will frequently be tempted to turn aside and browse. Valuable tables of oxidation-reduction potentials, standard free energies of formation and other numerical data are given as appendices. A few errors have been noted in the text; but these are mainly of the 'printer's error' type, and should not normally cause any confusion. The book is excellently produced; the text and illustrations are clear and pleasant.

This book can be recommended without reservation to any chemist at any level as a valuable addition to his book shelves, and one which will probably insist on an increasingly frequent usage.—C.L.W.

BIBLIOGRAPHY OF INDUSTRIAL DRYING. Technical Information and Documents Unit, Department of Scientific and Industrial Research, London. 1952. 27s. 6d.

The importance of conserving fuel has directed increasing attention to the value of efficient drying processes. Industry can no longer afford to waste energy by using drying methods which are uneconomical and every improvement that can be effected represents an important gain. New processes and equipment have enabled great advances to be made in the drying and preservation of materials sensitive to heat and oxidation and in the development of methods for extremely rapid drying. Unfortunately the interchange of technical information between one industry and another and among those concerned generally with drying has not kept pace with technical development. Although symposia on drying have been held from time to time, the information is dispersed and is often in unrelated form.

In 1948, Sir Frank Engledow, chairman of

the Food Investigation Board, Department of Scientific and Industrial Research, drew attention to the importance of increased efficiency in industrial drying processes. He particularly emphasised the value of pooling the knowledge of methods used in different industries, studying the efficiency of different drying processes, and formulating and providing for the fundamental research problems of industrial drying. As a contribution towards meeting the first of these requirements, the DSIR has published a comprehensive bibliography covering the period 1924-50.

The bibliography occupies three volumes and its eight hundred pages carry some 4,500 entries. These have been arranged in five sections which in turn are divided into sub-sections containing appropriate subheadings under which the references are listed alphabetically. By this means the entries have been presented in a very convenient form for easy reference.

The first section deals with general principles, which are considered under the headings of fundamentals, instruments (hygrometric), instruments (not hygrometric), moisture determination, sorption, and air conditioning and gas drying. Typical of the system adopted is the treatment of hygrometric instruments, the references to which are classified under the sub-headings of general, dew point instruments, electrolytic instruments, electric and thermo-electric instruments, and wet and dry bulb instruments.

Section 2 is devoted to drying processes and equipment and contains sub-sections on general drying and general equipment, followed by separate sub-sections dealing with control, efficiency, corrosion, cyclones, film and drum drying, electro-endosmosis, freeze concentration, freeze drying, heat pump, high frequency heating, infra-red heating, mill drying, packaging, pneumatic drying, rotary, spray drying, solar heat, tray drying, tunnel drying, turbo dryers, ultra-sonics and vacuum drying.

The three remaining sections are concerned respectively with agriculture, food, and industrial materials. Included in the last section is a general sub-section containing over 350 references which relate to some 60 materials, including many chemicals. This timely publication fills a need that has been widely felt and is in itself an important contribution to fuel economy.—A.G.T.

KOLORIMETRISCHE ANALYSE. By Bruno Lange. 4th edition. Verlag Chemie, GMBH., Weinheim. 1952. Pp. xxiii + 395. Figs. 104. Dm. 23.80.

Analytical chemists may already be acquainted with this work through the American edition of 1945. Considerable additions have been made to the new edition. The first chapter, which deals with the theory and apparatus of colorimetry, has been extended to include descriptions of newer types of colorimeter and photoelectric apparatus.

Chapter II, which deals with the uses of colorimetry in inorganic chemistry, occupies well over half of the book, and contains a comprehensive collection of detailed methods for the colorimetric estimation of a wide range of cations, anions, gases and miscellaneous inorganic materials such as silica. Additions to this section in the new edition are methods for antimony, iodine and fluorine.

In chapter III, which deals with organic colour reactions, there is a brief review of the field followed by detailed instructions for the estimation of the more important organic compounds and groups for which methods are available. This chapter includes useful brief reviews of the literature pertaining to oils and fats, and to pharmaceuticals. Two short chapters deal with the use of colorimetry for miscellaneous physico-chemical measurements, and for the estimation of hydrogen ion concentration.

Chapter VI deals at considerable length with colorimetric methods of value in medical and biological work, and this has also been extensively revised. A final short chapter deals with colorimetry in food industries.

There is an adequate subject index, but it is a pity that no author index has been included to simplify the search through to the very extensive literature references which have been given throughout the work.

As is well-known, colorimetric methods are probably the most widely used of all modern instrumental methods of analysis, and this book is a very creditable attempt to provide in one handy volume an adequate selection of the many methods which have appeared in the literature. It can be recommended to any laboratory making use of the methods as a very useful handbook and a component digest of a surprisingly extensive amount of information within reasonable dimensions.—C.L.W.

OVERSEAS

Sunvic Continental Office

Sunvic Controls, Ltd., the well-known manufacturers of temperature control and measurement equipment, announce that, owing to their extending interests in Europe, they have found it necessary to open a continental office. Accordingly, their European manager, Mr. B. Hveissel, is transferring to Copenhagen where his address, as from 15 August, will be:—Sunvic Controls, Ltd., Skindergade 38, Copenhagen K., Denmark. Telephone: Central 1402.

Trinidad's Cat-Cracker

Trinidad Leasehold's new catalytic cracking plant at the Pointe-a-Pièrre Refinery, Trinidad came on-stream on 29 July, the opening ceremony being performed by the Acting Governor. The new plant is part of the expansion programme of the company, to enable the Regent Oil Company, the marketing organisation for Trinidad Leaseholds, to provide high-quality petrol when top grade fuel is again permitted.

Modernisation of the refinery has cost over £5,000,000, of which the catalytic cracking unit and its ancillary plants form the main feature. Over 86 per cent of the materials used were manufactured in the United Kingdom and erected by U.K. contractors, so that only a small amount of American currency was required. The work has been spread out over six years.

Congo Pulp Mills

A Belgo-American group is said to be planning an important pulp mill in Mayumbe, and similar projects are under study in the Congo. Two Belgian groups are contemplating setting up pulp mills, one in Ubangi, the other near Lake Leopold II. The possibilities of using bamboo as raw material are also being considered by one mill. A technical mission sponsored by the Belgian Syndicate of African Cellulose is presently studying the use of papyrus as raw material, mainly for the manufacture of high quality pulp used in the textile and plastics industries. It is generally believed that as soon as the mission completes its survey, the first mill will be built with an initial daily capacity of 100 tons of pulp.

Location Announced

Pakistan's first paper mill, the Chief Conservator of Forests, Punjab, announced recently, will be near Chittagong. The Chief Conservator, who was on his way to Canada, where he is leading the Pakistan Delegation to the Forestry Conference, added that the mill would utilise the bamboo areas of Chittagong and would produce all kinds of paper except newsprint.

Record Output

The total value of Northern Rhodesia's mineral output in 1951 was a record £71,000,000, an increase of nearly £22,000,000 over the 1950 total. The output of electrolytic copper totalled 103,000 tons worth £21,000,000, compared with the 77,000 tons valued at £12,700,000, in 1950. Blister copper production was 205,000 tons, the highest since 1940, and was valued at nearly £41,000,000. Zinc totalled 22,000 tons valued at £5,000,000; lead, 13,000 tons worth £2,000,000, and cobalt alloy 36,000 cwt. valued at £1 000,000.

Water-Soluble Silicone

The first water-soluble silicone has made its appearance on the American market. Manufactured by the General Electric Corporation of the U.S.A., the major use for it at present is in the field of water-repellents in masonry where it can be applied to the surface or applied as an integral mix. However, the company feel that it can find uses in the textile field, in paper products, catalyst preparations, additives for sodium silicate, and as additives for water-base paints to improve their washability. The active component in the new silicone—SC-50—is sodium methyl siliconate. It is supplied in liquid form with 20 per cent silicone content. On contact with the air, carbon dioxide hydrolyses the salt to give methyl siliconic acid, which is a very weak acid, and polymerises.

To Double Production

The Skaland graphite works near Senja in Northern Norway are to increase output from 4,000 to 8,000 tons a year in the near future. Ninety-seven per cent of the graphite is exported to the United States, Great Britain, India, Italy, and other countries.

HOME

Selling Prices Reduced

A. Boake, Roberts & Co., Ltd., have announced that owing to a decrease in raw material costs they have been able to make the following reductions in selling prices as from 1 August: amyl acetate technical and amyl acetate B.S. 552: 1950, decreased by 45s. per cwt.; di-amyl phthalalate, decreased by 4½d. per lb.

Lime Scheme to Continue

Both Houses of Parliament have now approved The Agricultural Lime Scheme (Extension of Period) Order, 1952, which makes provision for continuing for a further two years the payment of Exchequer contribution towards the cost of acquiring and transporting lime for use on agricultural land in the United Kingdom.

To Erect New Factory

Leda Chemicals, Ltd., of Wharf Road, Ponders End, are reported to be taking over a site at Angel Estate, Edmonton, N.9, for the erection of a new factory.

Name Altered

The International Tin Research and Development Council has resolved that it will in future be known as The International Tin Research Council. This change will not affect the policy of the Council nor alter its current activities.

Copper Price Agreement

Negotiations between the Ministry of Materials and its main Commonwealth suppliers on the price of copper were concluded on 1 August. Arrangements made provide for a fixed price which will remain in force for a minimum period of six weeks and thereafter unless, owing to changed circumstances, any of the parties desires fresh negotiations. In view of those arrangements the Ministry has reduced its selling price of copper by £2 to £285 a ton, delivered consumers' works. Discounts and premiums remain unchanged.

Change of Address

On 5 August the British Wood Preserving Association moved to 6 Southampton Place, London, W.C.1. The telephone numbers are Chancery 4347 and 4348.

Change of Address

The address of the Manchester office of Monsanto Chemicals Limited has been changed to 601-602 Royal Exchange, Manchester. Telephone No.: Deansgate 7878; telegrams: Monsanto, Manchester.

Calcium Carbide Prices Revised

An increase in the retail price of calcium carbide by £2 a metric ton for all deliveries made on or after 1 August, is announced by the Ministry of Materials. This rise was necessitated by the increased railway rates. Distributors are authorised to increase their retail prices to consumers by the same amount on and after that date. Calcium carbide packed in 100-lb. or 110-lb. drums will, as previously, be charged for additionally at the rate of £1 a ton on all prices.

Allocations Restored

Due to increased purchases of crude glycerine from abroad, The United Kingdom Glycerine Producers' Association has been able to restore, as from 1 August, the glycerine allocations of firms which received reduced supplies after 1 December, 1951.

Obituary

The tragic death of SIR JACK DRUMMOND, D.Sc., F.R.S., and his family by shooting while on a holiday in the Basses Alpes, France, occurred on 5 August.

A nutrition expert and biochemist, he was responsible for working out the balanced diet for Britain during the last war.

Born in 1891, Jack Drummond was educated at King's College School, Queen Mary's College and King's College, London. In 1913 he was appointed a research assistant at King's College and then joined the biochemical staff of the Research Institute of the Cancer Hospital, London, of which he became a director five years later.

He was appointed Professor of Biochemistry in the University of London in 1922, and held the post until 1945. Since 1946 he had been director of research to Boots Pure Drug Co.

PERSONAL

MR. STANLEY PAUL CHAMBERS, C.B., C.I.E., has been appointed a deputy chairman of Imperial Chemical Industries, Ltd. Mr. Chambers, who is 48, has been a director of I.C.I. since 1947. There are two other deputy chairmen, Mr. A. J. Quig and Dr. A. Fleck.

Mr. S. P. Chambers

From 1937 to 1940 Mr. Chambers was Income Tax Adviser to the Government of India, and in 1942 he became a Commissioner of Inland Revenue—a position he held until joining I.C.I. in 1947. From 1945 to 1947 he was chief of the Finance Division, Control Commission for Germany, British Element.

Among the new J.P.s for the County of Lancaster is MR. DEREK SPENCE, of Halsall House, Halsall, near Ormskirk, managing director of Messrs. Peter Spence & Sons, chemical manufacturers, Farnworth, Widnes.

MR. E. PETER BUTLER has been appointed managing director of Messrs. Wm. Butler & Co. (Bristol), Ltd., chemical manufacturers and importers of petroleum products, rosin and turpentine. A great grandson of the founder, he joined the company straight from school in 1932, becoming a director in 1939.

MR. H. HALL and MR. R. G. W. EADIE have been appointed directors of Bristol & West Tar Distillers, Ltd., it was announced last week. Jointly they will be responsible for the commercial side of the company's activities in the sphere of tar distillation.

Mr. Hall has been associated with the parent company, Wm. Butler & Co. (Bristol), Ltd., for nearly 30 years, and during this period he has been engaged at one time or another in almost every section of the company's business.

Mr. Eadie, a graduate of Glasgow University and Fellow of the Royal Institute of Chemistry, was for 17 years with the Glasgow Corporation, chemical works department, and during four of the war years served the Ministry of Fuel & Power as Deputy Coal Tar Controller.

He joined Wm. Butler & Co. (Bristol), Ltd., in 1944 as a consultant and later became sales manager in charge of refined chemical products.

The directors of J. M. Steel, Ltd., have announced the appointment of MR. A. G. BALLARD as a director of the company as from 1 August. Mr. Ballard has been with the firm 25 years and for the last four years has been acting as commercial manager. He served throughout the war in the R.A.F. returning to business life in 1945.

MR. D. B. COLLETT, vice-president and general manager of the Dunlop Tyre & Rubber Goods Co., Ltd., Toronto, is returning to England to join the main board of the Dunlop Rubber Co., Ltd., as an executive director. He will work in close association with MR. A. HEALEY, executive director in charge of all production including technical development, research and labour policy.

Obituary

We regret to announce that SIR WILLIAM THOMAS GRIFFITHS, vice-president of International Nickel of Canada and chairman of Mond Nickel Company from 1945-50, died at Smallfield, Surrey, on Wednesday, 30 July.

A metallurgical expert, Sir William had had published a number of papers on this subject in scientific and technical journals. From 1944 to 1946 he was president of the Institute of Metals.

A member of the Grand Council of the Federation of British Industries, he had served on the councils of the British Iron and Steel Research Association, the British Non-Ferrous Metals Research Association, the British Cast Iron Research Association and the Iron and Steel Institute.

Publications & Announcements

EXTRACTION of the iron content from dry materials is the subject of a new leaflet (Publication No. 122) issued by Rapid Magnetic Machines, Ltd. Two types of electromagnetic separators are described and illustrated. The Waterfall type in which the material flows under gravity over a series of stepped magnets of high intensity is suitable for ammonium nitrate, clays, fertilisers, plastics, powders, resins and so on. The type 'V' vibratory separator is for the extraction of fine and tramp iron from fine powders and like materials (containing not more than three per cent of iron) and which require mechanical motion to precipitate the flow. Another new publication by this company (No. 134), gives details of its wide range of permanent magnetic equipment—chutes, plates, grids, humps and traps—and illustrates a number of typical installations.

* * *

MANY raw water supplies need to be clarified before the water can be used for domestic or industrial purposes. In 'Clear Water' a new booklet published by Imperial Chemical Industries, Ltd., the methods used to remove colour and turbidity are outlined and a description is given of how chemical coagulents can be used to improve the mechanical processes of sedimentation and filtration. Some post-clarification treatments, to render the water suitable for certain specific purposes, are also considered. Illustrations range from laboratory studies to typical plant for municipal and industrial water supplies and the 'Alfloc' trailer unit which enables full scale tests to be made on sites.

* * *

A NEW booklet published by Rockweld Ltd., of Croydon, Surrey, describes additions to the company's range of stainless steel electrodes. It is entitled 'Lime Type Stainless Steel Electrodes (extra low hydrogen).' These are complementary to existing types, and have been introduced because the lime-titania coating that has been used up to now, while it is excellent for general work, has been bettered for specialised applications. Thus, where it is not possible for the fabricator to ensure that the electrodes are dry prior to welding, less pin-holing is liable to be encountered with the lime type than with the lime-titania type. This can occur in site welding, for example, or in damp shops where drying facilities cannot readily be organised. Under heavy restraint, too the lime coating will show less tendency to fissure than the lime-titania one. The company feel that the introduction of this new type of electrode will help to raise even higher the standard of stainless steel welding in this country.

* * *

ELECTROMAGNETS Limited, manufacturers of electro-magnetic lifting and separator equipment, of Bond Street, Birmingham, 19, have recently published a new catalogue leaflet, No. 62, which gives technical details and a few photographs of their recently developed magnetic conveyor head unit. This machine is claimed to have two or three times the intensity of a magnetic pulley or drum of comparable size, due to greater depth of magnetic field, all usefully employed, and a stationary coil unit of unlimited depth. The magnetic unit can be serviced without disturbing the conveyor, as the coils can be removed leaving the head roller formation undisturbed. A wide range of these head units is available. A patent has been applied for.

* * *

A HOMOGENISER made by Ultrasonics Ltd., of Cheapside, Bradford, Yorkshire, is the subject of a pamphlet recently issued by them. This homogeniser works on an ultrasonic principle, the actual homogenising being performed by a thin blade which vibrates at its own frequency in the liquid stream at inaudible frequency. Cavitation takes place continuously in the volume swept out of its tube by the vibrating blade, causing violent molecular acceleration in the medium passing over the blade, and in effect minor explosions take place continuously. Resultant pressures of the order of 30,000 p.s.i. are thereby released locally, while the actual pressure at the pump is 150-250 p.s.i. The vibrating element and jet form are all encased in a resonant bell which concentrates the vibrations and ensures that the velocity of the jet across the blade is maintained regardless of whether the vibrating element is submerged or above the level of the liquid. Output of the 'Rapisonic,' as it is called, is 5-7 gallons per minute.

DEVELOPMENTS in coal tar technology during the period July-December of last year are outlined in the latest edition of *Review of Coal Tar Technology* (Vol. III, Part 2) published by The Coal Tar Research Association. As usual this excellent report is divided into two sections—'Coal Tar and Coal Tar Products', and 'General Chemistry and Chemical Technique'—and as usual full references are given. The range of subjects dealt with is just as wide as ever and the edition is just as indispensible to the coal tar technologist as its predecessors. The price for non-members of the CTRA is 5s. and the address of the Association is Oxford Road, Gomersal, near Leeds.

* * *

A NEW technical bulletin on the bulk chemical 2-ethylhexanol has just been released by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, it is announced. This material finds extensive application in the preparation of surface coatings, textiles. leather dressings, rubber, asphalt, insect sprays, and disinfectants. It is used as a solvent; a defoaming, dispersing, and wetting agent; and as a chemical intermediate. It is also used for processing chemicals and paper, for dry-cleaning operations, and in photographic developing. Copies of this technical bulletin, F-7908, which lists physical and chemical properties and shipping data, are available on request from Carbide and Carbon Chemicals Company, 30 East 42nd Street, New York 17, New York.

* * *

SYNTHETIC rubber, which is a really unfortunate misnomer according to the author, is the subject of an article by Dr. W. J. S. Naunton in the July issue of *Endeavour* (Vol. XI, No. 43), published by Imperial Chemical Industries, Ltd. The wide range of interests covered by the magazine are reflected by articles in this issue which range from 'Recent Biological Investigations in the Red Sea' and 'The Nucleic Acid of the Chromosomes' to 'The Industrial Diamond'. Since its inception in 1942 *Endeavour* has become a leading scientific journal and its continued publication in English, French, Spanish, German and Italian, maintains its original principle of helping scientists overseas to keep those contacts which their British colleagues have always so much valued.

DRYING by vacuum sublimation or 'freeze drying' as the technique is now called, was the subject of a symposium held by the Institute of Biology in London in June, 1951. A full review of the conference, which was attended by some 400 persons, is given by Dr. R. J. C. Harris in *Vacuum* (Vol.1, No. 4), published by W. Edwards & Co. (London), Ltd. Other contributions include an article on 'New Trends in Vacuum Research Based on Ionisation Phenomena,' by Dr. von Engel (Clarendon Laboratory, Oxford University), and there is a useful list of classified abstracts.

* * *

PUBLISHED recently by the Association of Consulting Chemists and Chemical Engineers, Inc., of America, is an interesting booklet entitled 'The Consulting Chemist and Chemical Engineer in a World Economy.' This states succinctly, and with a profusion of case histories, the rôle and competence of the chemical consultant, as well as details and examples of his services. The rôle of the consultant in the chemical industry is a nebulous one, and consequently this lucid exposition of when, where, how and why he can help the manufacturer is a welcome one. The booklet does not advertise so much as explain and remove possible doubts about the function of a consultant. Copies of the booklet may be obtained from the Association at 50 East 41st Street, New York, 17, N.Y., price $1.00.

* * *

SINCE it began to specialise in industrial electronic control equipment some three years ago, Elcontrol Ltd., has developed and expanded its business to such an extent that it has outgrown its original premises and has now moved to a larger factory at Wilbury Way, Hitchin. The company's range of standard items has been increased and now includes photoelectric pyrometer for resistance welding and heat treatment control, an electronic weld timer and an electronic proximity switch having wide applications. Advances are also announced in the field of automatic ignition and flame failure control of gas fired installations and revised literature on this subject has been issued. Inquiries are welcomed at sales headquarters which remain at 10 Wyndham Place, London, W.1. (Telephone: AMBassador 2671).

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Law & Company News

The following are taken from the printed reports, but we cannot be responsible for errors that may occur

New Registrations

Chemresearch, Ltd.

Private company. (510,070). Capital £100. Analytical and consulting chemists. Director: Mrs. E. Schmeidler. Reg. office: 8 Arthur Street, E.C.4.

Glamorgan Alkali and Acid Co., Ltd.

Private company. (510,118). Capital £20,000. Manufacturers of chlorine hydrochloric acid and caustic soda and hydrogen, etc. First directors to be appointed by the subscribers. Solicitors: Freshfields, 1 Bank Buildings, Princes Street, E.C.2.

Vacuum Industrial Applications Ltd.

(29,019). Capital £2,000. Manufacturing and consulting engineers, metallurgists, chemists, etc. Subscribers: J. C. Henderson and J. Henderson, 257 West George Street, Glasgow.

Company News

Benn Brothers, Ltd.

The directors of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, recommend the payment of the following final dividends less tax for the year ended 30 June, 1952:—3 per cent on Preference shares, which with the interim dividend of 3 per cent paid in February makes 6 per cent for the year. 15 per cent on Ordinary shares as increased by the issue of bonus shares in December, 1951, which with interim dividend of 5 per cent paid in February makes 20 per cent for the year on such increased capital. 4s. per share on the Deferred shares.

A. Boake Roberts and Co., Ltd.

Gross profits of A. Boake, Roberts & Co., Ltd., for the year ended 31 March, 1952, are given in a preliminary statement as £571,000, an increase of £42,000 over the previous year. This, however, includes a non-recurring profit of £118,000 due to a change in the basis of stock valuation. A sum of £365,000 has been allocated to reserves compared with £150,000. Dividend, allowing for share bonus adjustment, is maintained at 17½ per cent and cost £44,000 net. Report and accounts will be issued on 22 August. Meeting will be on 16 September.

British Glues and Chemicals, Ltd.

Consolidated profit of British Glues and Chemicals, Ltd., for the year ended 30 April, 1952, amounted to £821,618 (£892,434), including £56,926 relating to previous years. Profit of the holding company was £311,808 (£353,608). A second interim dividend is proposed on ordinary shares of 10 per cent (25 per cent) making 15 per cent (30 per cent) on capital increased by bonus from £225,000 to £550,000. No further dividend for the year is recommended.

German Potash Syndicate

Royal Exchange Assurance (as trustee) and J. Henry Schroeder & Co. (as the principal paying agent) announce that, with the approval of the International Bondholders' Committee, they have withdrawn proposals which, with the agreement of the potash producers who are guarantors for the Potash Syndicate of Germany 25-Year Sinking Fund Gold Loan, were submitted to the Tripartite Commission on German Debts. After further discussion with the potash producers, it has been decided to await the outcome of the Conference on German External Debts before considering whether further proposals can be formulated for submission in due course for approval of the bondholders' committee and the bondholders.

Griffiths Hughes Proprietaries, Ltd.

Referring to difficult trading conditions, Mr. C. B. Green, chairman of Griffiths Hughes Proprietaries, Ltd., in his statement shows that group profits declined by 29 per cent, to £248,000, but sales were only 1.18 per cent lower for the year ended 31 March, 1952. Since the beginning of the year, however, prospects were improving. Sales had shown a substantial rise, and there was an improved output of certain of the group's manufactures. A period of financial difficulty would appear to be coming to an end. Meeting, Manchester 13 August.

Morgan Crucible Co., Ltd.

Group profit of the Morgan Crucible Co., Ltd., for the year ended 31 March, 1952,

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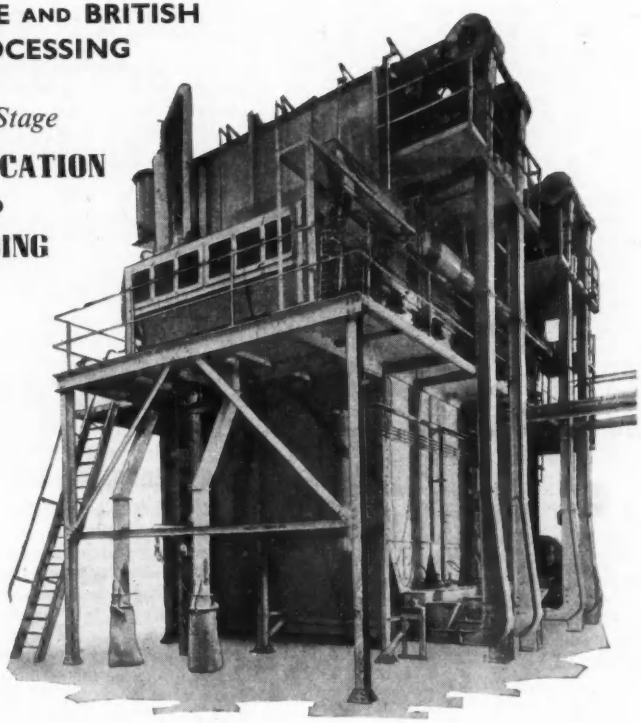

We manufacture a unique combined Humidifying and Blending Machine, designed and patented by the well known Dextrine manufacturers, Messrs. Jas. Laing, Son & Co. (M/C) Ltd., Manchester and Goole. Humidification accomplished during a thorough blending in large batches represents a real step forward in Dextrine manufacture as regards both cost and improvement in quality.

The machine which we manufacture has given very satisfactory results. It consists of a twin unit, each half of which will hold 12 to 13 tons of Dextrine. The moisture content of this charge can be raised by approximately ¼ per cent for each hour during which it is kept in circulation. Meanwhile, the contents are thoroughly blended, and bag-to-bag variation within the batch is obviated.

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before tax but after all other charges, rose by £450,000 to £1,967,000. For the sixth successive year a final dividend of 8¼ per cent is recommended, making a total of 12½ per cent for the year.

Murex, Ltd.

A final dividend of 9 per cent on ordinary stock payable on 18 September is announced by Murex, Ltd., making a total of 15 per cent for the year ended 30 April, 1952, as against 12½ per cent in 1951. Shortages of certain raw materials prevented all demands being met in full and resulted in a small decrease in volume of overall sales. Consolidated profits of the group for the year under review were £659,000 (£759,000) after providing £948,000 (£890,000) for estimated taxation liabilities. A sum of £100,000 was placed to contingency reserve and £400,000 to replacement of fixed assets reserve. Meeting 17 September.

Triplex Preference Offer

An issue of new capital of a novel type is announced by the Triplex Safety Glass Company. The board is seeking power to create 350,000 Redeemable Cumulative Preference Shares of 10s. each. These shares are to be offered for subscription to existing shareholders only at a price of about 20s., subject to market conditions. A meeting has been convened for 6 August to consider the proposals. The new shares will have two special features. They can be converted at the holder's option, into 10s. ordinary shares at par, between 15 October and 30 November in 1954 and 1955, and they will be repayable in a winding-up at 21s. Proceeds of the issue will be used for new plant, extension of factory space and additional working capital.

Market Reports

LONDON.—All sections of the industrial chemicals market are quiet and an active interest is unlikely to be renewed until after the holiday period. Export trade in chemicals is fairly good with a steady flow of inquiry from the Continent.

Lower prices have been announced for 'Bisol' diamyl phthalate, amyl alcohol and amyl acetate following the reduction in the cost of fusel oil. Nothing of fresh importance has been reported in the coal tar products market. Prices are steady against a moderate inquiry.

MANCHESTER.—Trading conditions on the Manchester market for heavy chemical products during the past week, from the point of view both of contract deliveries and fresh bookings, have been relatively quiet. This has been due largely to many consuming establishments being closed down for the annual holiday stoppages, and also to the reduced demand for a wide range of chemicals from the bleaching, dyeing and finishing trades. Price changes so far as the bread-and-butter lines are concerned have been few compared with a week ago. The call for fertilisers has continued on a seasonally quiet scale. Among the by-products, crude tar has been in steady demand, as have also creosote oil, carbolic acid, and most of the light distillates.

Penicillin for Hungary

THE first factory in Hungary to specialise in the manufacture of antibiotics has been built in the provincial centre of Debrecen, and will start penicillin production this year. The new factory, named the Duclos Pharmaceutical Works, will produce enough penicillin to supply all Hungary's needs and to have a surplus for export.

The first experiments in penicillin production started three years ago in the Chinoin Factory in Budapest, under Dr. Zoltán Földi. Production has now reached the pilot-plant stage.

Spanish Fertiliser Production

During 1951, Spanish production of phosphate and potassium fertilisers continued the upward trend initiated five years ago. Over a 1,000,000 metric tons of superphosphates were obtained in that year, as compared to 900,000 tons in 1950 and only 300,000 tons in 1943. Export of these types of fertilisers will be possible in the near future. Ammonum sulphate production also reached its highest figures, 20,000 metric tons, in 1951.

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Twelve copies of application, together with the names of three persons to whom reference may be made, should be submitted not later than September 15th, to the undersigned, from whom further particulars may be obtained.

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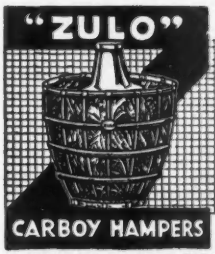

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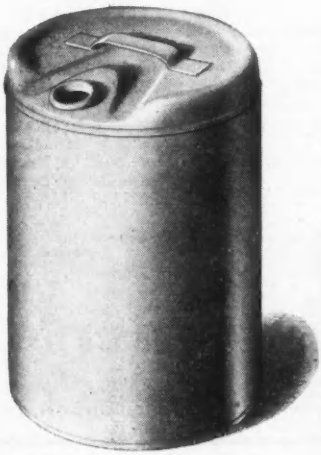

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30,000 satisfied users of Stream-Line Filters have proved that the regular cleaning of oil improves engine performance and reduces the frequency and cost of overhauls.
In the saving of oil alone, the filter pays for itself in a few months.

STREAM-LINE FILTERS LIMITED
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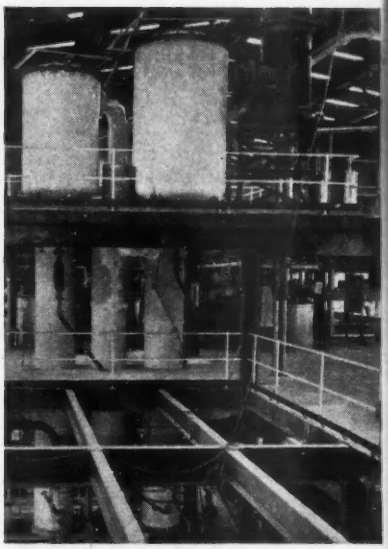
BELL SHAW WORKS, INGATE PLACE, LONDON, S.W.8



KESTNER EVAPORATORS
for the concentration of all liquids

Kestner Climbing Film Evaporators are acknowledged to be the simplest and yet the most efficient for the evaporation of liquids in bulk. The above illustration is of a Kestner Evaporator used for Acid Liquor concentration. But numerous other types are made including the Salting type Forced Circulation Evaporators for brine and electrolytic Caustic Soda, Acid Evaporators with Tantiron, lead or carbon contact, also multiple effect Evaporators both for Vacuum and non-vacuum working and with or without thermo-compression.

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HYDROFLUORIC ACID

ANHYDROUS AND SOLUTIONS ALL STRENGTHS
ALSO PURE REDISTILLED 40% w/w

FLUORIDES, Neutral
Sodium, Magnesium, Barium, Potassium, Lead, Zinc, Ammonium, Aluminium Lithium, Chromium.

BiFluorides (Acid)
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Double Fluorides (Cryolites)
Sodium HexafluoAluminate
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SILICOFLUORIDES
Magnesium, Zinc, Ammonium, Barium, Potassium, Lead, Hydrofluosilicic Acid.

BOROFLUORIDES
Sodium, Potassium, Ammonium, Lead, Copper, Zinc, Cadmium, Fluoboric Acid Solution.

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Glass Etching Acids

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Starbright Filtrates

In one mechanical operation the Metafilter filters out every trace of solid matter. Cleaning by reversal is equally simple — no filter cloths to clean — no expensive filter pads to replace.
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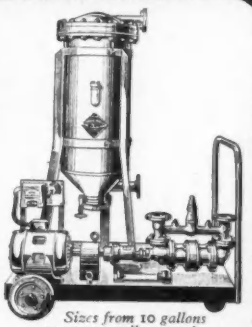

Sizes from 10 gallons to 10,000 gallons per hour.

METAFILTRATION

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PICKLING TANKS 90 FEET LONG WORKING SUCCESSFULLY

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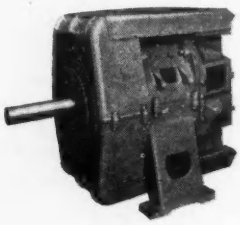

...to dirt and dust, acid splashes, corrosive fumes in gas works, boiler houses and coke oven plants

...When you employ
Metrovick TECAC Motors

The illustration shows a Metrovick TECAC direct-current motor with integral fan-operated air cooling circuits.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED TRAFFORD PARK MANCHESTER 17
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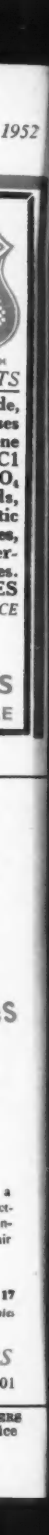
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